The Chemical Age

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Import Restrictions

PEOPLE connected with the chemical and especially the dyestuffs industry are awaiting with some concern an authoritative announcement respecting the Imports Restrictions Bill which is expected to be introduced early after the Recess. It may be presumed that by this time the principles of the measure have been more or less finally decided, and that the charge of the Bill will naturally fall to the President of the Board of Trade. The restrictions now in force are largely war restrictions which must naturally lapse as soon as the ratification of peace is completed. This, of course, does not mean that these restrictions will disappear. It simply means that the way will be clear for the substitution of a peace system for a war system, and presumably the new Bill is intended to accomplish this purpose. It will be of great interest to know what line the Government have decided to follow, what proportion of the existing regulations will be retained, what new restrictions will be introduced, and what the general effect will be on British import and export trade.

As regards the dyestuffs industry the fundamental principle of British policy has already been decided, namely, that the connection between dyestuffs and explosives is so vital that it is essential to the future safety of this country that we should be self dependent. The alternative is simply a reversion to the helpless condition the war found us in, and that is recognised as impossible. So far as the first principle is concerned the nation is practically agreed. But when it comes to the methods for carrying this principle into effect there is room for wide diversity of views. We must have ample plant and technical knowledge, and both must be freely at the service of the Government in case of necessity. The Government, therefore, to secure these rights must make some contribution, and the unwelcome procedure of direct Government investment in business has to some extent to be accepted. Already we have invested a substantial sum in the dyestuffs industry. Is this system of direct subsidy to be continued and extended, or, abandoning this method, have the Government decided on another plan? Apparently they have, for the Bill presumably will control exports and imports, although it is rumoured that they may seek to accomplish their purpose by a system of prohibition of imports alone, to be relaxed by a system of licensing to meet urgent requirements.

Now assuming that the Government adopted the latter policy, it would mean in the case of dyestuffs a very rigid form of protection. Presumably dyestuff users would not have the choice of buying from abroad dyestuffs which are already being produced in this country, because such competing materials would not be admitted. The free trade arguments against such a system are powerful, but, on the other hand, if a young British dyestuffs industry is to be brought to maturity a market must be found for it, and such a market can only be guaranteed to it in this country. It is Protection open and unashamed. And yet it is difficult to see, if the Government plan is to be carried out, how it is to be avoided. One can readily imagine the reply that Sir Robert Horne would make to any body of British merchants and users who waited upon him, and eloquently pointed out all the risks and dangers and hardships involved in such a policy. He would remind them that the Government's policy had been deliberately decided on after full discussion and that the discussion, so far as its first principle goes, could not be reopened. He would frankly admit the hardships to the British user and to the British import-

ing merchant of having the market of the one and the legitimate business of the other drastically curtailed. He would probably appeal to their patriotism to put up with any temporary losses and inconvenience as the inevitable price to be paid for gaining the ultimate end in view, and he would advise them to accommodate themselves to the temporary conditions. In a word, they would be appealed to to put national before trade ends.

Of course a fiscal policy of this importance is far more than a departmental matter. It would be debated with great vigour in Parliament. If, however, it passed, what would be the position of the British user and merchant? Obviously, their field would be very much narrowed. Their only hope of relief would be under the licensing system which might be open and elastic or close and rigid. The constitution of the authority controlling the issue of licenses would therefore be a matter of vital importance. The severity or ease of its rule might determine the success or failure of the system. Too rigidly exercised it might indeed produce the worst fruits of the protective principle. Wisely and liberally exercised it might possibly keep the inevitable disadvantages within tolerable limits, and so constitute a working compromise between national and trade interests. If, therefore, the Government's policy as suggested should survive the criticism of Parliament, traders and users must concentrate their energies on the licensing machinery, insisting that their views are fully represented on the controlling authority, and that private trading interests receive the most generous consideration that can be reconciled with national safety.

Government Chemist's Report

THE annual report of the Government chemist for the year ended March last shows that the total number of samples examined was 368,898, an increase of nearly 80,000. The increases are indicative of the revival in trade after the return to peace conditions, while large decreases are naturally shown in samples submitted by war departments. Those who favour beer as a beverage will be consoled to hear that of 969 samples tested, only five were found to contain arsenic in excess of the limits suggested by the Royal Commission on Arsenical Poisoning, namely, the equivalent of one-hundredth of a grain of arsenious oxide per pound in the case of solids or per gallon in the case of liquids. Cider, we regret to learn, was not always found to consist solely of fermented apple juice, and seven samples of sour cider were all found to contain sufficient acid to render them unsaleable as commercial ciders. Samples of wood naphtha and of mineral naphtha, intended for use in the preparation of methylated spirit, to the number of 864 were examined. The naphtha represented by 848 of these samples was approved as fit for methylating purposes, whilst that represented by the other 16 samples was found to be unsuitable. In connection with the use of pure and specially denatured alcohol in manufacturing operations, 65 samples of petroleum ether and other denaturing substances have been examined, as well as 32 samples of pure undenatured alcohol and 20 samples of specially denatured alcohol. With the object of preventing the illegal use of methylated spirit in making tinctures, essences, perfumes, and medicinal preparations, 50 samples taken from manufacturers and retailers were examined, in addition to those taken under the Export Tincture Regulations. For the purpose of controlling the use of duty-free methylated and other denatured spirit in connection with manufacturing operations, 539 samples of recovered spirit, residues from stills, articles manufactured with industrial spirit, and preparations containing such spirit were examined.

The report states that owing to the heavy duty on saccharin, which has approximately 500 times the sweetening power of sugar, the inducement to smuggle this article into the country is very great. The presence of saccharin has, therefore, to be searched for in all preparations in which there is any probability of its occurrence, and 121 samples of substances imported were specially examined with this object. Three hundred and twenty-one samples of saccharin products were drawn for the purpose of assessing the amount of drawback payable on exportation. The manufacture of saccharin in the United Kingdom, which had ceased for some years, was resumed in 1917, and 253 samples of saccharin and of the materials used in its production were examined in connection with the assessment of duty, an increase of 50 per cent. on the number examined last year.

Eighteen samples of sheep dips were received for examination in connection with application by manufacturers for inclusion of their preparations in the official "Schedule of Efficient Dips." Before the Ministry of Agriculture give their approval to any dip they must be satisfied that the formula provides for a sufficient quantity of a recognised active ingredient and that the dip has been made in accordance with the formula. In nine cases the samples were found to agree with the formulæ, and were of effective strength at the proposed dilution; two were deficient in active ingredients at the dilution submitted by the makers, in the remaining seven cases the formulæ required modification to ensure an efficient dip. Eleven samples of approved dips obtained in different parts of the country were also examined, with the object of ascertaining whether the dips as sold or used correspond in composition with the samples which had received the Board's approval. The analyses showed that one of these had not been prepared according to the formula previously submitted and approved. The services of the laboratory were utilised by the Joint Committee of the Ministries of Fisheries and Transport on Tar Pollution. In addition to the examination of road drainage, a large amount of work was carried out in order to determine the nature and proportions of the possible toxic constituents which might be present in drainage from tarred roads. In the course of this work new and delicate methods of detection of some of the constituents were devised. Carbolic acid, for example, can now be detected and estimated when present in less proportion than one part in a million parts of water. Further details of the investigation

will appear in a report to be issued by the Joint Committee.

Among the samples examined for the Ministry of Munitions were liquid fuel taken from a German tractor, salts and brines for the occurrence of potash and bromine, and materials used in connection with experiments upon the recovery of potash from felspar. The services of the staff were also utilised to collect and examine the dust in cement flue works. On examination this was found to be rich in potash in a form readily available for use. Arrangements, we are told, were made to extract radium from many thousands of luminous dials, compass cards, gun sights, and similar materials, and to convert it into a form suitable for further use. The matter was in this instance complicated by the presence of the overwhelming proportion of paint with which the radium was mixed for use on the dials, &c. Practically all the radium present in the paints was recovered in a usable form and at a comparatively small cost. This interesting work is reported to be still proceeding.

One hundred and six samples of caustic potash and of raw materials used in the manufacture of the same were examined. Incidentally a method was worked out for differentiating between sodium chloride and potassium chloride in solid caustic potash. Included in the samples examined for the Board of Trade were 532 taken from the supplies of potash material obtained from Germany. One of the three parts into which each sample was divided was examined here, a second portion being analysed in Germany, whilst the third portion was retained in a neutral country for reference in case of dispute. Samples of coal, patent fuel, briquettes and materials for producing them were examined for the Coal Controller in connection with the Coal Regulations. A sample of "coal saver" examined consisted almost wholly of common salt, as has frequently been found to be the case in the past.

Factors and Merchants

THE question whether factors and merchants should be admitted as exhibitors to future British Industries Fairs may be regarded at first sight as of no great general interest to merchants. In reality it is a question of first rate importance to them—namely, whether they are to be recognised by the Government as a distinct class, forming a section of the recognised machinery of British trade, or are to be treated as so many negligible units. The manufacturers have for some years been steadily organising themselves for collective action, and are now in their relations with Government departments in a stronger position than ever. The merchants, on the other hand, form one of the least organised business communities in the country, and when it is complained that Government departments are inclined to give more consideration to the manufacturing than to the merchanting interest the retort is that the merchants have only their own lack of initiative to blame for this condition of things. The question, therefore, whether in the future arrangements for British Industries Fairs merchants are to have a defini'e p'ace or no p'ace at all is one of vita' importance. The issue, in fact, is whether in Government arrangements they are to be taken into account or entirely overlooked; and if they are content to be ignored in one field, the official inference, not unnaturally, is that they may be safely ignored in others. The Chemical and Dyestuff Traders' Association, it seems to us, has done a useful service in so forcibly stating the claim of the merchant class to official recognition.

Synthetic Petroleum?

A RECENT prediction by Sir E. Mackay Edgar that within ten years the United States might be buying from England 500,000,000 barrels of oil annually, has so alarmed our American friends that one of their chemists, Mr. E. G. Acheson, of New York, pleads very seriously for immediate investigation into the problem of producing petroleum synthetically. Clearly if the prediction is to be fulfilled, there is not much time to be lost, for it is generally agreed that the United States natural petroleum sources are approaching exhaustion, and the efforts of the British authorities to secure a controlling interest in the new potential oilfields of the world reveals a certain amount of intelligent prevision. Mr. Acheson makes the problem of synthetic production seem almost easy. Petroleum, he points out, is composed of approximately 80 per cent. of carbon, and 20 per cent. of hydrogen, and these elements can be obtained so easily and cheaply that their combination to produce synthetic petroleum ought not, he argues, to be an insoluble difficulty. Unfortunately the chemists of the United States appear to be lamentably unfamiliar with the subject. Many of them, Mr. Acheson states, have never seen a sample of oil shale, and he suggests that the Bureau of Mines should stimulate their interest by distributing among them liberal samples of oil shale, and appealing to them to begin research into the problem.

The Calendar

Sept 15	Institution of Petroleum Technologists: "Utilisation of Volatile Oils," by W. R. Ormandy, 6 p.m.	Canada Building, Crystal Palace, London.
15–16	The Institute of Metals: Autumn Meeting.	Barrow-in-Furness.
15–17	Institution of Mining Engineers: Annual General Meeting.	Manchester.
21–24	Iron and Steel Institute: General Meeting.	Cardiff.
Oct. 1	Society of Chemical Industry (Manchester Section): "The Structure of the Molecule in Crystalline Solids," by Professor W. L. Bragg. 7 p.m.	Grand Hotel, Manchester.
9	Mining Institute of Scotland: General Meeting.	Edinburgh.
18	Physical Society of London and Faraday Society (Joint Meeting): "The Physics and Chemistry of Colloids."	London.
18	Royal Automobile Club: "Alcohol Motor Fuel," by Professor H. B. Dixon. 9 p.m.	Great Gallery, Royal Automobile Club, Pall Mall, London

Silica Glass

A recent number of "Chimie & Industrie" contains an interesting article by Professor G. Flusin, on silica glass, and its physical and chemical properties. A summary is given below.

THE use of fused silica as a substitute for glass has been developing as an industry for nearly a century, and may be said to have had its origin in the researches and experiments of the physicist Gaudin who investigated the properties of fused quartz, and more particularly of drawn quartz fibres. He published the results of his researches in two notes to the Académie des Sciences de Paris in April and May, 1839. Among other things he came to the conclusion that: (1) Fused quartz is only viscous at temperatures above its melting point, and never fluid, (2) considerable volatilisation takes place in the neighbourhood of the melting point, (3) fusion converts quartz into an amorphous or vitreous condition, (4) fused quartz may be subjected to considerable sudden variation of temperature without injury, (5) fused quartz is disintegrated by prolonged heating. These conclusions have been confirmed by subsequent investigation.

Varieties of Silica

Silica both in the free and combined state is one of the most widely occurring substances in the world. It occurs in the anhydrous crystallised form most frequently as quartz, but is also found in two other crystallised forms, tridymite and cristobalite. The two latter always occur in very small crystals, frequently in volcanic rocks. Silica also occurs as chalcedony and similar substances of this type such as agate, which possess a fibrous crystalline structure only visible in the microscope. These forms contain a small proportion of water. Silica may be prepared artificially as an anhydrous amorphous powder by ignition of the hydrated oxide, and this substance is also found naturally in some minerals. Silica glass, or fused silica is an amorphous, vitreous substance, and is also found in some volcanic rocks.

Silica may be obtained with a proportion of water of hydration varying from 0·5 to 90 per cent., and this fact naturally raises some doubt as to whether definite hydrates of silica exist. Van Bemmelen has shown that the de-hydration of gelatinous silica proceeds without any discontinuity, and the researches of Le Chatelier, Zsigmondy, Bachmann, &c., have shown that silica is chemically anhydrous, and that water is present in capillary spaces as a physical addition only.

Allotropic Forms of Silica

A large number of allotropic forms of silica are known, the principal being quartz, tridymite and cristobalite which are crystalline and are each known in two forms, α and β, and also amorphous silica, known in the form of precipitated silica and vitreous or fused silica. These varieties are capable of transformation one into the other, and the conditions under which this may be effected are of great importance in the manufacture of silica bricks and silica glass. α-quartz, which is the ordinary form, may be transformed into β-quartz at about 570° to 575°C. according to Le Chatelier, or 575 ± 2°C., according to Wright and Larsen. The transformation is reversible and is very sensitive to a change of temperature near the critical point. A difference of 0·1°C. is sufficient to effect the transformation. The two modifications of tridymite and cristobalite are also capable of reversible transformation, but as these varieties of silica are of less interest, particulars are omitted. Precipitated silica is amorphous, but when heated to 1,000° is transformed progressively into cristobalite, and at higher temperatures into vitreous silica. If the heating is sufficiently rapid the silica does not pass through the cristobalite stage. The three crystalline varieties of silica are also capable of mutual, reversible transformation. It has been found that the silica in silica bricks used in a furnace is progressively converted into tridymite, at a minimum temperature of 870°C., and Fenner has found that above 1,470°C. cristobalite is formed. The region of stability of tridymite, therefore, appears to be between 870°C. and 1,470°C., and the stability of cristobalite above 1,470°C. was confirmed in 1919 by Fenner. More recently, however, Endell and Rieke have suggested that the first product of the heating of quartz is always cristobalite, and that tridymite is subsequently formed if the temperature is maintained below 1,470°C. Tridymite and cristobalite may also be transformed reversibly into one another, and all varieties are transformed into vitreous silica at higher temperatures.

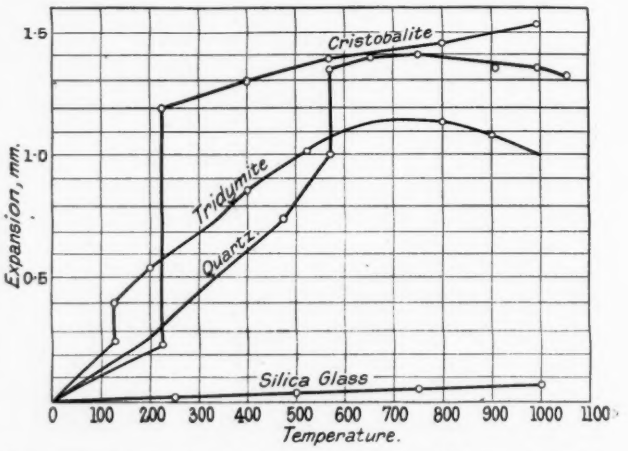
Of greater importance to the user of silica glass are the conditions under which vitreous or fused silica is re-converted into crystalline forms. When fused silica is heated above 1,000°C. transformation into cristobalite proceeds at a rate which depends on the temperature, the state of sub-division of the silica and its purity, and the time of heating. The transformation is complete after heating for several hours to 1,500°C. The final product is probably tridymite if the heating is sufficiently prolonged. It does not appear possible to transform vitreous silica into quartz without the use of catalytic agents, such as potassium chloride.

Fusion of Quartz

The melting point of quartz is difficult to determine accurately, owing to the great viscosity of the molten substance, and the impossibility of directly observing the change of state. The method of determining melting points which depends on the observation of the rise in temperature during heating with a view to determining the point at which the temperature becomes constant due to the latent heat of fusion, is also difficult of application, since radiation pyrometers only are available for such high temperatures, and these are less accurate. From the results of a number of investigators, it appears that quartz shows the first signs of softening at about 1,650°C., and becomes a viscous liquid at 1,750°C to 1,800°C. The high melting point renders it impossible to deal with fused silica by the usual glass-blowing methods, and its great viscosity even at high temperatures renders it difficult to free it from small gas bubbles which are present throughout the mass. These, however, are not detrimental in use except in cases where transparency is required. One of the peculiarities of silica which was noticed by Gaudin as early as 1839 is that it is strongly volatile at temperatures slightly above its melting point, and it is even volatile below that temperature, though the latter phenomenon is probably due to a partial reduction in a reducing atmosphere and subsequent oxidation.

Physical Properties of Silica Glass

A detailed account of the physical properties of silica as determined by various investigators up to the present time is given. These include its density, variation in volume consequent upon change of state, expansion by heat, specific heat, latent heat of fusion, conductivity, optical, electrical and mechanical properties, and permeability to gases. Some of



these are of more direct interest to the physicist than to the chemist, and consequently they are omitted here. The very low coefficient of expansion which makes it possible to subject silica glass apparatus to abrupt changes of temperature without breakage is a property which is of great value to chemists. The mean coefficient is only about 49×10^{-8} as compared with a value of 600 to 900×10^{-8} for ordinary glass. The expansion of silica glass increases regularly up to 1,000°C. whereas the expansion of the crystalline varieties of silica is many times greater and is not at a constant rate. The small expansion

of silica glass and its regular increase in comparison with the sudden changes in crystalline silica are illustrated graphically in the diagram. Silica glass at ordinary temperatures is a very good electrical insulator, better than ordinary glass, but not as good as porcelain ; it has, moreover, the great advantage over glass that it does not acquire a surface conductivity in a moist atmosphere.

The very high melting point of silica would suggest at first sight that it would be valuable for use in experiments on gases at high temperature, but unfortunately it is permeable to gases at high temperatures. According to experiments by Mayer, silica glass is impermeable to gases at ordinary temperature and pressure ; hydrogen diffuses through it at a temperature of 330°C. and a pressure below atmospheric, while nitrogen and oxygen diffuse only at atmospheric pressure and a temperature above 430°C. The permeability increases with the temperature and pressure. Wüstner has shown that the permeability of silica glass follows the general laws of diffusion of gases. At temperatures between 700°C. and 1,000°C. the absorption of hydrogen in fused silica is of the same order of magnitude as that of hydrogen in water at ordinary temperatures.

Chemical Properties of Silica Glass

Silica glass may be considered as absolutely insoluble in boiling water, according to the experiments of Mylius and Meusser, and Kohlrausch, who found that water after prolonged contact with silica showed no increase in electrical conductivity. Silica glass is soluble in alkali hydrates and carbonates, and in barium hydrate, and also in salts having an alkaline reaction. The action depends on the concentration, the temperature, and the time of contact. At ordinary temperature salts have no solvent action, but the action of bases is appreciable. The greatest solvent action is produced by caustic soda and potash. Silica glass is not attacked by acids with the exception of phosphoric and hydrofluoric, and it is coming into increasing use for apparatus for condensing mineral acids. Phosphoric acid dissolves silica glass after prolonged contact especially when hot, and hydrofluoric acid attacks it energetically with the formation of silicon fluoride, or silicofluoric acid, according to the conditions. The use of silica glass should, therefore, be avoided when any materials containing fluorides are being treated. The relative action of hydrofluoric acid on ordinary glass and silica glass has been investigated by Gautier and Clausmann ; they find that, taking the solubility of ordinary glass as 1,000, silica glass is represented by 100, quartz parallel to its axis by 11, and quartz perpendicular to its axis by 1. Some metals, more particularly the alkaline earth metals, magnesium, aluminium, and cerium, exert a reducing action on silica, and it has been found that silica glass tubes are strongly attacked by nickel-chromium wire at 900°-1,000°C., which is sometimes used for electric heating. Experiments by Hedvall in 1916, on the action of lime on various varieties of silica showed that precipitated silica reacts rapidly with lime at 1,000°C., but the reaction of silica glass is only about one-tenth as much, while quartz and cristobalite are not acted upon below 1,400°C. The original article contains a detailed record of the results of experiments on the properties of silica and a very complete bibliography of the literature of the subject.

German Chemical Industries

IN a review of German Chemical Industries published in this week's *Board of Trade Journal*, reference is made to the shortage in coal and raw materials, the closing of plants, the scarcity and high cost of labour, and the poor transportation facilities. As a consequence, a very great scarcity of the finished product is reported so that orders cannot be filled. Some reports specifically mention the deliveries of chemical and other products to France as the occasion of the shortage on the market. The impression of industrial hardship that is conveyed is, however, offset by the financial statements that record, almost without exception, the declaring of dividends largely in excess of those of 1918. The explanation of the discrepancy is, of course, to be found in the heavy foreign demand at the high prices of the last few months of 1919. The chemical industry seems to be at a standstill. The chemico-pharmaceutical industry is in some respects in a better situation than in January, in others worse. Dyestuffs have shown a brief revival because of the receipt of a moderate amount of coal.

American Chemical Notes

(From Our American Correspondent)

THE political situation has dominated everything for the last few months, and industry in general is likely to remain in a decidedly unsettled state until after the Presidential election next November.

An outstanding feature of industrial importance is the present pronounced scarcity of gasoline which has made itself felt throughout a large section of the country, places as far apart as San Francisco and Seattle being equally affected. While in certain quarters there is a tendency to place the blame for this on the transportation muddle, it is realised in expert circles that this represents only a minor phase of the problem. Owing to the stupendous increase in the output of motor vehicles (passenger and truck) within the last few years, together with the fact that the peak of possible gasoline production has already been attained, it is an undoubted fact that, should this proportional increase be maintained, the supply of gasoline after 20 years will have been exhausted. The present yield of gasoline from American crude does not average more than about 20 per cent., while that from Mexican (on which considerable hopes were placed at one time) is as low as 3 to 5 per cent. In suggesting the use of alcohol as a substitute, not enough attention is paid to the magnitude of the quantities involved (3 to 4 billion gallons). For example, it has been calculated that to replace the entire consumption of gasoline by alcohol would require the utilisation of at least 50 per cent. of the entire foodstuffs produced in the country. Needless to say, the problem is engaging the serious attention of both scientist and technologist.

The manufacture of synthetic camphor is proceeding apace, the latest manufacturing recruit being the Monsanto Chemical Company, St. Louis.

Some interesting work from the Bureau of Chemistry, Washington, D.C., has recently been announced dealing with the chemical products derivable from corn cobs. They find that, by very simple technique, it is possible to convert the cobs primarily into cellulose and a gummy product. The cellulose is obtained in a pure state with a yield of some 30 per cent. of the weight of the corn cobs, and its use as a "filler" for dynamites is recommended. The gummy material is a valuable adhesive product, and by simple hydrolysis yields furfurol in quantity about 15 to 16 per cent. of the weight of the corn cobs taken. They suggest the utilisation of this latter material as a dye intermediate (substitute for benzaldehyde), the claim being made that it should be possible to produce this material at a cost of a few cents per lb. Some idea of the magnitude of the quantities involved may be gleaned from the following figures : The United States produces from 2,500,000,000 to 3,000,000,000 bushels of corn every year, which yield in turn some 18 to 20 million tons of cobs. The establishment of a plant for the manufacture of corn-cob products in the Ohio valley is being contemplated. Three "shellers" will furnish 24,000 tons of cobs a year, and the plant, operating on a basis of 100 tons per day, is expected to turn out cob adhesive, furfurol, acetate of lime and cellulose.

The continued scarcity of formaldehyde has stimulated scientific research in many directions ; among others, to its possible synthesis from marsh gas. It is rumoured that acetaldehyde is now being used with considerable success in the moulded plastic industry.

Butyl alcohol and acetone are at present being produced in considerable quantities from corn by the Farnbach-Weissman process at the plant of the Commercial Solvents Company, Terre Haute, Indiana.

Dr. Herty's suggestion to hold a combined meeting of the various American and Canadian chemical societies in New York in September, 1920, concurrent with the Chemical Exposition, and the visit of the British members of the Society of Chemical Industry to Canada and this country, is meeting with hearty support.

H. H.

A verdict of "suicide while of unsound mind" was returned at the inquest concerning the death of Henry J. Parker (47), who was found dead, last week, in the laboratory at the gas works, Avon Street, Bristol, where he was employed as an assistant analytical chemist.

The Artificial Silk Industry in Japan

By Professor K. Yamada

The following article is published almost exactly as received. Professor Yamada is making an extended tour for the purpose of studying the chemical industries of foreign countries, especially the cellulose industry. He has already visited America, and is at present in Yorkshire, attending lectures in the cellulose and dyestuffs industries, and pursuing other investigations.

JAPAN is a raw silk producing and exporting country, and she has attained equal rank in this respect with France, Italy and China.

Japan has steadily increased her production as the demand has become so great, and now her production is enormous. Especially, during the war, the production of Japanese silk to foreign countries has enormously increased.

In consequence of the increased price of silk yarn it was natural for the non-silk-producing countries to contrive some silk substitute, and so the artificial silk industry also has been started, and its products were treated as merchandise before the war. Since the war the artificial silk industry has especially come into prominence. For example, the American manufacturer turned out in 1914 300,000 lbs., and in 1918 approximately 13,000,000 lbs. Now the production exceeds greatly that of the year preceding the war. Also the statistics of rapid growth of artificial silk stockings show that in 1917 2,000,000 pairs were exported, in 1918 6,000,000, in 1919 15,000,000.

Artificial silk, a substitute, of course, for natural silk, is made from cheap pulp through various chemical processes Artificial silk is admittedly inferior to natural silk in its quality, in dyeing, in the weakness of its wet state, and in durability, consequently the cost is much less than that of natural silk.

However, a development which is little short of marvellous has been made in the dyeing of artificial silk. Two colour effects have been accomplished, and a combination of three colours may yet be accomplished. On the other hand, the acetyl-cellulose process has been successful. The artificial silk made through this process is fairly strong in its wet state and has good durability.

While artificial silk possesses these imperfections, still the demand in recent years has greatly increased. It is chiefly used for women's wear, and hosiery made from a combination of artificial silk and natural silk or artificial silk alone.

Seeing the importance of the artificial silk industry, Japan has taken up this problem in a thorough and enterprising fashion, though at present it is still in its infancy in that country.

In 1905 Germany sent to Japan some artificial silk, and from that time the imports of artificial silk yarn gradually increased. The following table shows this increase :—

Year.	Lbs. imported.
1905	145
1906	12,955
1907	65,952
1908	49,703
1909	247,718
1910	1,987,354
1911	145,140
1912	214,756
1913	231,344
1914	232,439
1915	240,058
1916	55,619
1917	252,308

This increasing importation has attracted the attention of Japanese chemists. After many efforts the research work in this line brought some success. In 1912 the Mie School of Technology published the results of experiments in the manufacture of artificial silk yarn through the cuprammonium process.

One of the graduates of the school undertook to form a company, "The Japan Artificial Silk Co.," with a capital of £50,000. The product of this company was not good, compared with the yarn imported into Japan, in strength, in elasticity, in evenness of thread and fluffiness, so the product is quoted on the Japanese market at about one-half the prices of the imported yarns.

There was recently organised a large artificial silk company under the name of Teikoku Artificial Silk Co. This company has two factories, one at Yonezawa, the other at Hiroshima. The Yonezawa factory began to produce the commercial yarn during 1916. The factory of this company is managed by Mr. Hata, who was once a professor of the Yonezawa Technical College. The process which is adopted in this company is an improved viscose process. It is expected by the Hiroshima factory that a minimum of 300 lbs. of yarn per day will be produced. During the war the Yonezawa factory produced 200 lbs. a day, and exported most of it to China, India and the Oceania.

Another company of the same kind is now about to be constructed near Kioto to make artificial silk through the nitro-cellulose process.

At present we have three separate companies making artificial silk by different processes; but the Japanese artificial silk industry is still in its infancy, and calls for further improvement before it can attain its height of production.

The material for artificial silk making is a well-known wood pulp. Wood pulp has been imported from Sweden, Norway and Canada; but recently the Chemical Paper Material Co. has been constructed, and the factory should be enough for the demand of the Japanese chemical industry and still be able to export the product to foreign countries.

The problem of labour in Japan is greatly discussed. Before the war, wages were very low and the hours of labour considerably long; but during the war the wages greatly advanced and the hours of labour have been shortened.

The demand for artificial silk for use in the manufacture of hosiery, ribbons, women's wear, millinery specialities, draperies, braids, plush, &c., has increased so much that all manufacturers must realise the need of an almost limitless supply if the demand be even partially met.

Japan realises that rapid world progress has made nations independent; yet each nation must itself be independent in world commerce if it is to carry its just share of the world burden. Japan is ready and anxious to play its part in world advance, to carry its full share of the load, to be just to others as well as to herself, and, above all, to exchange experience and knowledge with all men from all countries.

The Affairs of Phineas Keats

AT Birmingham last week Phineas Keats (27) described as a chemist, of Mary Street, Balsall Heath, who is accused of extensive frauds, was again remanded, Mr. Day, for the prosecution, stating that the police inquiries were not yet complete. The warrant, he added, charged the accused with obtaining £4,000 on July 22 and £1,200 on August 5 by false pretences from Joseph Davies, but it had been stated that the frauds involved something like £50,000 to £60,000 so far as investigations had proceeded. It appeared that the two gentlemen who alleged they had been defrauded had included in the total profits which they expected if certain deals had taken place, and the £50,000 or £60,000 mentioned did not represent the actual cash lost. Prisoner had been financed in business by Mr. Davies, and he appeared to have got into touch with a man who had transactions in Government surplus stores, which he resold. Fascinated by this man's success, prisoner started on the same lines, borrowing money from a Mr. Hirschfield and Mr. Davies for the purpose. Evidence would be submitted that prisoner represented that he was in a position to purchase some hundreds of tons of hypo soda, and that he had already resold it to certain chemical firms at a substantial profit. Of the money obtained by prisoner £2,000 was paid to Mr. Hirschfield, who was pressing for the repayment of a loan in connection with another transaction, so that he had been robbing Peter to pay Paul. The balance had been traced to prisoner's own account, his wife's account, and other accounts having no connection with hypo soda. There was no doubt that prisoner had been a fugitive from justice, and he had to be brought back from South Cornwall.

In making a strong application for bail, Mr. Hatfield said prisoner's disappearance was due to depression, and he made no concealment of his identity. There was no record against prisoner. Keats was remanded for fourteen days, bail being granted, himself in £2,000 and two sureties of £1,000 each.

Decahydronaphthalene or Dekaline

By Dr. Stanley Smith, O.B.E.

The mention of decahydronaphthalene by Mr. E. de Barry Barnett (THE CHEMICAL AGE, *September 4, p. 254*) *suggests to the author that our readers may be interested in a fuller account of this product. The sulphur difficulties are stated to have been overcome, and the dekaline prepared for the market is said to take the place of turpentine and other solvents to perfection. We give Dr. Smith's own description of it.*

TURPENTINE is considered the best, as it is the most widely used, of solvents for the resins and oils utilised in the enormous industry concerned with manufacturing paints and varnishes. About 25,000 tons of turpentine oil are annually imported into this country. It is unnecessary for me to enter upon a lengthy discussion of the chemistry of this valuable solvent, specially in view of the fact that I want, for the moment, to interest users of turpentine spirits in yet another of the "substitutes," which I claim is fully capable of supplementing the supplies—failing and inadequate to present demands—of the real article. Briefly, the "rectified spirits of turpentine" are as described in Dr. Martin's invaluable work of reference, "a water white, mobile, light refracting liquid, of sp. gr. 0·640–0·872, distilling between 156°C. to 170°C.

The use of the term "substitute" is often unfair and misleading. In the case of turpentine substitutes there are several upon which every reliance can be placed, when they are adopted in partial or even total substitution for the genuine article. Sometimes physical characteristics, such as smell or its absence, are apt to foster an illogical prejudice in the minds of users, inasmuch as they are accustomed by habit to associate the pungent reek of turpentine with the only true efficiency. Here and there, it is true, one may come across an evilly ordorous proposition, such as a shale spirit too generously charged with sulphur; but, taken on the average, I can range no very formidable list of objections to the partial or total use of many substitutes for turpentine oils.

Mr. Dancaster, B.Sc., an authority on these matters, tells us that chief among these substitutes are rosin spirit, shale spirit, petroleum spirit and coal-tar naphtha, and he adds that "all these may be used as adulterants of real turpentine or as substitutes for the latter." It is also whispered that the cheaper kinds of turpentine are sometimes used to adulterate the dearer, which simply means that all buyers must look to the chemist for the proper evaluation of their purchase. The true "substitutes" are, however, sold as such, and there is no deception in the matter, unless we regard the adoption of "trade names" in lieu of "plain English" as a mild form of deception—*i.e.* in cases where the former run the latter rather close. It is an odd thing that a trade name will often sell a commodity which, under its real cognomen, seems to affright the market. "Sillee Sylke" might command the financial support of the whole millinery world, but who would look twice at "Acetate of Cellulose" or "Our Celebrated Cellulose Ester"?

There are various distillates of mineral oils which have found extensive practical use, and the well-known white spirit is a valuable competitor on the market for turpentine substitutes. It is a fairly slow evaporator and not unpleasant in smell. Again, among the naphthalene derivatives are to be found some substitutes of first-class quality. I do not wish to criticise the present substitutes in detail, but it is necessary to mention that these commodities, or some of them, certainly have their faults. Benzine shares with others a liability to blister, and rosin is not alone in being too brittle. Rosin oil is representative of a class which prevents the proper drying of the paint, and nearly all the present substitutes are too volatile and too inflammable. The odour of a substitute, in so far as it diverges from that of turpentine, may be a consideration to trade, but it cannot (when not actually unpleasant) be regarded as a serious matter from the scientific point of view. The only thing that matters is whether the solvent does the work required or not. I propose to help out the turpentine supplies with a decahydronaphthalene, which is the highest of several hydrates of naphthalene, and which for my purpose (namely, as a substitute for turpentine) is claimed to be by far the best and most perfect in type.

The physical and chemical properties of this "dekaline" (one is bound to shorten its ponderous chemical title) are briefly as follows: Distilling point, 190°C.; flash point, 60°C., and sp. gr. 0·9. Its smell is aromatic and mild, somewhat reminiscent of camphor, so we pass with ease all the requisitions of the substitute trade. As a solvent it is found to be rather more efficient than turpentine, and, fortunately, it is miscible in all proportions with the latter. Thus, in some cases it is thought desirable that the specific smell of turpentine should be preserved, and a mixture of 30 per cent. dekaline with 70 per cent. turpentine gives exceedingly good results. The chemical constitution of turpentine and of dekaline is closely related, and the qualities of these two solvents are practically identical, so much so that the "substitute" may be used by itself with perfect confidence. One point in favour of dekaline merits special attention. I refer to the speed of evaporation, as measured in the pure product. This important factor is rather lower than is the case with turpentine—an advantage for most purposes, since there is less loss through evaporation while boiling solutions or storing the finished products.

It is time to turn to the practical results accruing from the use of dekaline. Its high distilling point makes it a very desirable solvent for hard-melting rosins, and at the same time its high flash point reduces the dangers of ignition to a minimum. White spirit and petrol are not altogether guiltless in this respect, and they are not quite so safe to handle as this new and very potent solvent, with its high distilling and high flash points. The most satisfactory results obtained with dekaline are found to be in the manufacture of paints, varnishes and boot polishes. In all these trades it can be used to the entire elimination of turpentine. Again, it is demonstrated that dekaline can serve as a universal solvent in chemical factories, and as a cleansing fluid for machinery—especially for printing machines. It will take spots out of soiled garments of every description without leaving the least trace of either stain or smell. In this matter it is less dangerous than benzene, whilst it is equally effective. Finally, it can be used as a fuel for petrol or oil engines, and can even be burnt in paraffin lamps.

Queensland Arsenic

THE State arsenic mine, near Stanhope (Australia), is reported to be working three full shifts daily and the output last month amounted to 54 tons, most of which has been disposed of for the destruction of the prickly pear, at £10 a ton. The urgency of the need for this work prevents the export of the arsenic, but it is useful to know that should the supply exceed the local demand, there will be a good market available in England. Offers by London firms to buy 100 tons of arsenic at £60 per ton have been refused.

Australian Chemicals

FROM the *Industrial Australian and Mining Standard* we learn that the Woolwich Chemical Co., of Sydney, is at present manufacturing the following chemicals: Ether anæsthetic, ether sulphuric, ethyl chloride, collodion surgical, collodion flexile, collodion photographic, absolute alcohol, amyl alcohol, amyl acetate, amyl nitrite, ethyl acetate.

The company is one which is to receive aid from the import duties proposed in the new tariff, and they enumerate the following reasons why such support should be given to them:—

1. It has established in Australia the manufacture of products which, prior to the war, were imported from Europe and almost entirely from Germany. Such establishment was only possible through exclusion of imports resulting from the war.

2. It has, in order to establish such manufacture, applied scientific research to work out industrial processes. Such an application of scientific research, it considers, should receive full encouragement.

3. It has, by manufacturing certain products of a most essential nature, more especially anæsthetics, relieved what would have been otherwise an acute shortage in Australia, and also by its manufacture checked undue inflation of prices.

4. The company and other Australian manufacturers of similar products use practically nothing but Australian products, and are capable of meeting the entire Australian demand at a reasonable price.

5. The company guarantees to supply products equal to the best at present or during the past imported into Australia, and it therefore does not ask for protection of inferior products.

Innovations in the Metallurgy of Lead*

By Dorsey A. Lyon and Oliver C. Ralston

THE data reported in this bulletin are largely the result of experiments conducted by the Salt Lake City station of the Bureau of Mines, in co-operation with the Department of Metallurgical Research of the University of Utah. Three main problems in the treatment of lead ores had troubled metallurgists for many years, and were still largely unsolved at the time the Salt Lake City station was established. These problems were as follows :—

1. The treatment of lead carbonate ores with or without gold and silver.

2. The treatment of complex sulphides of lead and zinc either with or without metals other than lead or zinc.

3. The recovery of sulphide of lead from the finely divided "slimes" of the concentrating mills.

The third problem, that of prevention of losses in slimes, was being solved in a number of mills at the time the station was established. Flotation methods were just beginning to attract the interest of the general public. After some investigation it was decided that the most useful work of this sort that the station could perform would be the gathering and dissemination of information relating to the flotation process, rather than testing samples of the slimes submitted, because the flotation industry seemed to be in a healthy condition and the mill operators were willing to do their own testing with a view to preventing losses. Nearly every lead-concentrating mill of any size that formerly suffered serious losses of galena in slimes has now a flotation unit to increase the recovery of metal.

Oxidised Ores of Lead

In nearly every mining district where lead is found to any extent the lead in the upper or weathered parts of the ore deposits, generally above the level of the ground water, is oxidised, being usually in the form of the carbonate, and occasionally the sulphate of lead. In most of the Western States the lead carbonate is, as a rule, accompanied by silver, and occasionally by some gold or copper. Much of this "carbonate" ore has been very rich, owing to natural concentration by weathering. Such ores, because of their richness and their needing for the most part no roasting before smelting, have contributed greatly to the development of the mines.

Wherever the "carbonate" ore has been low grade, however, preliminary concentration has been necessary. In milling such ore serious losses in the tailings have often taken place owing to the well-known tendency of lead carbonate to "slime" by breaking into thin flakes that float away with the gangue. The concentrates obtained by gravity concentration have usually been of good grade and in demand by the smelters. Dumps of these slime tailings abound in almost every important base-metal mining district of the western United States, and in regions where oxidation extends to any depth there are vast quantities of such low-grade ores from which the high-grade ore has been gouged out. In fact, in many districts the custom has been to mine only the ore of smelting grade and to leave the lower-grade material in the mine. That ample supplies of low-grade oxidised ores of lead are available, and that much of this material is being wasted, cannot be doubted.

Methods of Treatment

Hydrometallurgical, pyrometallurgical, and flotation methods have been worked out for the treatment of the low-grade ores, slimes and tailings. The hydrometallurgical method depends upon the fact that lead chloride and lead sulphate are soluble in a saturated solution of sodium chloride and that lead carbonate and lead oxide also can be dissolved if the brine is acidified with either sulphuric or hydrochloric acid. Acid-brine solutions can be applied to any material that does not contain too much acid-consuming gangue to prevent practical application of the method. From such solutions it has been found practicable to recover the lead by electrolytic precipitation, as metallic lead, or, by the use of lime, as hydroxide of lead. These facts, which seemingly permit a simple process for the recovery of lead from such low-grade ores, form the basis of one of the proposed processes.

If such an ore contains silver in forms other than the chloride the brine solution will not dissolve the silver and some other step will have to be added to the treatment, such as chloridising roast to precede the leaching. This point has not been worked out to the same extent that the leaching of the lead has, for the reason that the methods of chloridising silver are already well known. Only a few tests have been run to see whether the lead and the silver can be leached simultaneously after a chloridising roast for the silver.

The flotation of argentiferous lead carbonate ores has been extensively tested, and on the ores to which it is adapted the results are encouraging. In order to make the particles of lead carbonate float from a pulp of the ground ore it has been found necessary to form a film of lead sulphide over them by introducing soluble sulphides, such as hydrogen sulphide or sodium sulphide, into the water in which the ground ore is suspended. The lead carbonate particles, by interaction with this material, are superficially converted into sulphide of lead. These particles can then be caused to enter the froth of a frothing-flotation process. For the ores containing silver in forms that are insoluble in brine, flotation is also a logical procedure. Most of the insoluble silver minerals are sulphides, and are especially amenable to flotation. Furthermore, if the lead is only partly oxidised and is partly soluble in brine, the natural sulphides of lead might be floated with the artificially filmed particles. Hence, there seems to be a definite field for each of the methods described.

Summary of Results

1. The application of new hydrometallurgical and other methods has been made to the following ore types :—
   - (*a*) Oxidised lead ores ;
   - (*b*) Oxidised lead ores containing precious metals ;
   - (*c*) Oxidised lead-zinc ores ;
   - (*d*) Simple sulphide ores of lead ;
   - (*e*) Leady zinc concentrates ;
   - (*f*) Lead-iron sulphide middlings ;
   - (*g*) Complex sulphide ores of lead, zinc, iron, and copper, with or without precious metals.

2. It has been found that a saturated solution of sodium chloride, common salt, is a good solvent for lead chloride and lead sulphate, and in all of the leaching tests reported herein, brine leaches, with or without the addition of sulphuric acid, were used.

3. The lead may be precipitated with lime from solutions that are not contaminated with other elements, and by electrolysis when the solutions are contaminated.

4. Three alternative methods have been tested in the treatment of materials containing oxidised lead, as follows : Sulphidising and flotation, acid-brine leaching of the raw material, and volatilisation of the lead with the recovery of lead chloride fume. All ores do not yield to flotation, and only those that do not contain excessive proportions of acid-consuming constituents yield to acid-brine leaching, whereas nearly all the materials tested have yielded to the volatilisation method, irrespective of the kind of gangue.

5. The oxidised ores of lead are usually argentiferous, but occasionally some gold is also present. Silver is often present in considerable amounts as the chloride, which is soluble in acid brine. The sulphide of silver is only slightly soluble in acid brine, so that the acid-brine method of treating oxidised lead ores usually fails to give good extractions of the silver. Sulphidising and flotation, where applicable, usually extract the precious metals together with the oxidised lead minerals. However, the experiments described herein have shown that the precious-metal minerals are not necessarily inter-crystallised with the lead minerals, and usually will be extracted in smaller proportions than is the lead. Chloridising roasting and leaching give better results, although the best conditions seem to be those where only part of the lead chloride is volatilised, the rest of the lead being leached with the silver and the gold. By raising the temperature of the roast to 900°C. or more, the silver and the gold will be volatilised with the lead, making leaching unnecessary.

6. Treatment of the oxidised zinc-lead ores is more difficult. Sulphidising and flotation will often remove the lead minerals, together with any silver that might be present, but much of this

*Extracted from Bulletin No. 157, issued by U.S. Bureau of Mines.

ore contains sulphur-consuming constituents that make sulphidising difficult. The lead can be removed by the chloridising and volatilisation method, although some of the zinc tends to accompany it, using up salt and lowering the extraction of lead.

7. The simple sulphide ores of lead may be treated by the volatilisation method, or by chloridising or sulphating roasting followed by brine bleaching. Where silver is present chloridising roasting and leaching seems to be the most successful method, and promises to compete with gravity concentration and flotation, followed by smelting.

8. Lead can be removed from leady zinc sulphide concentrates without affecting the zinc sulphide, by a quick chloridising and volatilisation. The lead chloride fumes can be caught in an electrical precipitator, and converted into metallic lead by fusion with lime and carbon, yielding a calcium chloride slag which is a desirable substitute for salt in chloridising and volatilisation.

9. Lead may be extracted almost completely from lead-iron sulphide middlings by the volatilisation method mentioned. Silver, if present, usually does not chloridise well, and does not volatilise; also, brine leaching gives rather low extractions of silver.

10. Extraction of the lead from the complex mixed sulphides of lead, zinc, copper, iron and the precious metals by the volatilisation method is likewise possible. Very little of the copper, silver, or gold is chloridised in this method, and hence, even after chloridising leaching, these metals remain with the zinc sulphide. The iron sulphide is generally converted to ferric oxide in roasting, giving the material the appearance of having been thoroughly roasted. However, the unaltered sulphides of zinc and copper, and any residual lead sulphide, can usually be removed from the roasted material by fine grinding and flotation, the iron being left in the residue.

11. The methods mentioned cover most of the important places in which lead losses occur. Possibly certain flue dusts from lead smelters could be advantageously treated by brine leaching, as the lead in the flue dust usually consists of basic lead sulphate and lead oxide, which are soluble in such a solution. However, no experiments were made with such dusts.

12. Some of the proposed processes, from a study of their probable costs, deserve serious consideration, as they promise to be cheap and usually give higher extractions of metal than are possible by the usual ore-dressing methods. The fact that most of them produce metal, not concentrate, will particularly recommend them to localities distant from smelting or transportation facilities. Also, methods adapted to arid conditions in arid regions are presented that should be of importance in the exploitation of the low-grade lead ores in some western districts.

Books Received

REPORT ON THE COMMERCIAL, INDUSTRIAL, AND FINANCIAL SITUATION OF JAPAN 1914 TO 1919. By H. Horne. London: H.M. Stationery Office. Pp. 75. 9d. net. (Cmd. 912).

REPORT ON COMPULSORY ADOPTION OF THE METRIC SYSTEM IN THE UNITED KINGDOM. Submitted by the Metric Committee appointed by the Conjoint Board of Scientific Societies. Published on the Authority of the Committee. Pp. 70. 1s.

REPORT ON THE ECONOMIC AND INDUSTRIAL SITUATION OF THE ARGENTINE REPUBLIC FOR THE YEAR 1919. By H. O'Chalkley. London: H.M. Stationery Office. Pp. 62. 6d. net.

INDUSTRIAL RECONSTRUCTION IN POLAND. By Dr. S. Janicki. London: Polish Press Bureau. Pp. 32.

MODERN PULP AND PAPER MAKING. By G. S. Witham. New York: The Chemical Catalog Company, Inc. Pp. 599. $7·50.

THE CHEMICAL ANALYSIS OF STEEL-WORKS' MATERIALS. By Fred Ibbotson. London: Longmans, Green & Co. Pp. 296. 21s. net.

ORGANIC CHEMISTRY. By A. Killen Macbeth. London: Longmans, Green & Co. Pp. 235. 6s. 6d. net.

THE FIREMAN'S HANDBOOK AND GUIDE TO FUEL ECONOMY. By C. F. Wade. Pp. 84. 2s. 6d. net.

PROFESSOR J. B. FARMER, F.R.S., of the Imperial College of Science and Technology, has been appointed by an Order of Council to be a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

British Industries Fairs

Chemical Merchants' Claim to become Exhibitors

AMONG the questions on which the British Industries Fairs Committee, appointed by the Board of Trade, are taking the opinion of chambers of commerce and commercial and trade associations, is whether exhibitors at the fairs should be restricted to manufacturers or thrown open also to factors and merchants. A comprehensive statement of the case for the admission of merchants as a separate section has been prepared by the Chemical and Dyestuff Traders' Association, in the course of which it is stated:—

1. The processes of sale, advertisement and distribution are the recognised function of the merchant, who has built up a delicate and comprehensive organisation for linking-up production and consumption, and accommodating supply to demand. The great majority of producers depend on the merchant for the regular absorption of their products. Even the very few exceptionally large concerns which undertake their own distribution do not thereby eliminate the function of the merchant; they merely take it on in addition to that of producer. The importance of the distributive process in trade is thus recognised by even the largest corporations who are able to undertake it themselves while the vast majority of producers must continue to depend for the regular disposal of their output on the services of the merchant. Any policy, therefore, which tended to depreciate the work of the merchant class and to weaken the efficiency of the distributive machinery would be regarded by our Association as damaging in a very grave degree to the interests of British trade.

2. The restriction of the exhibiting class to manufacturers would seriously weaken the representative character of the Fair and limit the appeal it is designed to make to potential purchasers. The Fair is primarily intended to attract foreign buyers, and there are very few manufacturers comparatively who sell direct to foreign buyers. If they have not an agent abroad the business is usually done through British factors or merchants, whose wide and highly specialised experience is thus at the service of the manufacturers. It is unlikely that foreign buyers would attend simply to obtain or inspect the supplies of a few British manufacturers. They would naturally desire the widest possible range of exhibits, and this object would be defeated by the decision to restrict the exhibition to manufacturers. It would further tend to give a monopoly to a group of the larger manufacturers; the great body of manufacturers, as well as the entire merchant class, would be unrepresented, to the great detriment of the Fair and of British trade.

3. On the other hand, the admission of factors and merchants as exhibitors would secure representation for the large class of producers who would otherwise be excluded and would make the Fair immensely more representative of British productions and more useful, attractive, and educative to the foreign buyer. If it is objected that this plan would result in the products of one manufacturing firm appearing through more than one exhibitor, our Association would strongly urge that this would be an additional advantage. It would secure a much wider exhibition and advertisement of British productions generally, and thus directly help to secure the primary object for which the Fair is organised.

4. As the majority of foreign buyers, like the majority of British manufacturers, do their business through factors and merchants, the exclusion of the merchant class would be a serious disadvantage to visiting buyers. Moreover, the introductions at the Fairs between foreign buyers and British factors and merchants would be of the greatest value to the extension of our foreign trade by establishing acquaintanceship and promoting trade inquiries calculated to result in new business.

5. Many classes of goods not manufactured in this country are imported by merchants, and are to a large extent re-exported from this country. The re-exportation of goods constitutes a considerable portion of British trade and has always been regarded as important by the Board of Trade, since it provides employment in this country and business for British shipping companies and is extremely valuable indirectly in its foreign and colonial commercial connections. This large section of trade would be entirely unrepresented if factors and merchants were excluded.

On these grounds the Association urges very strongly that British factors and merchants should be admitted and, indeed, their co-operation sought and encouraged as exhibitors, and that they should be recognised as a separate section.

Nitrate Situation in Chile

Production, Labour and Shipping Difficulties

No substantial sales of nitrate have taken place since the early part of the year. During the first fortnight of June last many rumours were in circulation regarding large sales being imminent, but no business of importance was done Owing in large measure to continued stagnation in the nitrate market, exchange fluctuated considerably in favour of London. Existing stocks of nitrate on June 30, the close of the statistical year, were calculated at about 970,000 tons, of which 830,000 belong to the members of the Nitrate Association, and 140,000 to producers outside the Association—*i.e.*, Americans and Germans.

The sales to date made by the Association for delivery from July, 1920, to April, 1921, are 1,343,000 tons, at prices averaging about 16s. 5d. per quintal of 46 kilos, which covers the whole of the stocks existing on the coast, plus the production to the end of September next, the monthly production of the Association being about 184,000 tons. Non-associated producers are believed to have sold all their stocks, plus the greater part of their production up to December next, this latter being about 46,000 tons monthly (Americans accounting for 8,000 tons), and at prices considerably below the Association average. The Germans have also sold substantial parcels of nitrate for consecutive deliveries in 1921 and 1922 at what seem to be very low prices to-day. Included in the production figures there are about 6,000 tons monthly of high potash nitrate (K.N.O.3), of which about 700 tons are made by the Germans.

The demand for nitrate continues brisk at the Association's fixed prices: but owing to difficulties of production and transport caused by labour troubles, shortages of coal, oil, water and rolling stock on some of the railways, the Association is seriously considering the limitation of sales for further future deliveries. It is possible, however, that further limited contracts will be made by the Association for delivery up to April, 1921.

The Commercial Secretary to the British Legation at Santiago, in forwarding to the Department of Overseas Trade the above report, which was furnished by one of the directors of the Nitrate Association, states that the Association is conducted by a board of 10 directors, of whom four are Government delegates, the executive being exercised by a Sales Committee of five. The Americans, who do not form part of the Association, state that they cannot join owing to the Shearman Anti-Trust Law. The Chilian Government has been putting continual pressure on the Germans to join the Association, but up to the present they have held themselves apart.

Regarding production difficulties apart from local strikes, fuel has become very scarce. Coal from the United Kingdom is unobtainable, from the United States of America supplies are difficult to obtain, and it is stated that export has been temporarily prohibited. Supplies of Australian coal, which is not economical for nitrate oficinas, cannot be depended upon. Chilian coal, owing to the recent continued strikes, is unobtainable, and also not economical when used. Oil fuel is becoming very scarce, and two British firms representing two large American oil companies have received information from their suppliers that, owing to decreased production and increased consumption, they must reduce, or in some cases cancel altogether, pending oil contracts.

The majority of the British companies have not greatly benefitted by the recent large sales, owing to the fact that the rail transport to Iquique by the Nitrate Railways, Ltd., falls so far short of the demand made on it. The Commercial Secretary is informed that several British nitrate oficinas have one year's production awaiting the convenience of the railway.

On the same subject, H.M. Consul at Antofagasta reports the total production and export for the last three years as follows:—

	1917/18. Qtls.	1918/19. Qtls.	1919/20. Qtls.
Production ...	64,773,489	50,707,926	42,551,779
Export ...	63,325,382	39,007,083	47,904,232

(Qtl. = 101·44 lb., English.)

Destination of exports for this year has been fairly evenly divided between Europe and the States. The exports for the present year would have been much greater but for a serious shipping strike, which broke out in June and which has seriously interfered with shipments. In pre-war days the total exports amounted to between 45 to 50,000,000 qtls.

Total production for the first six months of 1920 amounted to 26,158,367 qtls., and exports to 33,173,982 qtls. From these figures the great activity in nitrate circles for the present year can be seen. Total stocks on the coast as at June 30 amounted approximately to 27,500,000 qtls. Due to labour shortage and troubles respectively, and to the impossibility of securing more than 75 per cent. of contracted quantities of fuel oil, with every chance of a still further reduction, it is estimated that future production will not exceed present output.

The average cost on board is reported to be 12s. per quintal maximum. It therefore appears that large profits are being and will be made. Before the war sellers were content with pence per quintal profit, but apparently for the present profits are considered in shillings per quintal. Some of the cheaper producing factories must be making very large profits. It must be borne in mind, however, that the year after the Armistice was a bad year for nitrate interests, and also that speculators, for the first half of this year at any rate, have again secured the cream of the business, as was also very largely the case before and during a certain period of the war.

New factories are to be erected in the course of a year on grounds situated at Los Dones, which is about 50 kilometres along the Longitudinal Railway in northerly direction towards Toco. The production will be shipped either here or at Mejillones, as the Antofagasta to Bolivia Railway has taken over the northern section of the Chilean Longitudinal Railway.

The various national interests in the industry are approximately: Chilean, 36 per cent.; British, 34 per cent.; Yugo-Slav, 10 per cent.; German, 18 per cent.; American, 2 per cent.

The Nitrate Market

MESSRS. HENRY BATH & SON, LTD., in their monthly report on nitrate of soda, state:—

"Since our report on August 7 the nitrate market has been exceptionally inactive, even for the holiday season, and transactions appear to have been confined entirely to a few lots of nitrate required for loading early tonnage, among which were some second-hand sales of August made in Chile at 15s. 9½d. to 15s. 10d. per quintal f.a.s. and at 15s. 10d. here, and of September at 16s. to 16s. 4½d. according to date. The Association also sold about 10,000 tons in August at 15s. 11d. More distant nitrate has hardly been mentioned, and the nearest quotations at the close—about 17s. 1½d. for January-March, 1921; 17s. January-June, 15s. July-December, and 14s. January-December, 1922—are very nominal. There does not appear to be any new development in the political situation in Chile bearing upon the supply of labour for nitrate production, and the figure for August of 221,000 tons just received shows no falling off compared with the output for July.

"In his speech at the general meeting of the Nitrate Producers' Association held in Valparaiso on July 16, the president referred to the outstanding difficulties affecting production in the form of shortage of fuel, scarcity of labour and the defective carrying capacity of the railways serving the Tarapaca district; but in spite of these obstacles it is expected that including the production of non-associates, sufficient nitrates will be available for export in the twelve months ending June, 1921, to meet all probable requirements, unless a revival of demand in Central Europe in excess of reasonable anticipation should later on manifest itself.

"Business in retail markets for the current year's consumption continues moderate, and for Spring, 1921, has hardly yet opened, and until there is some development in this direction a resumption of general activity can hardly be looked for. Current quotations in France and Belgium are at present exchanges equal to about 20s. 9d. per cwt. c.i.f. for spot and 23s. for Spring 1921 delivery. The value of cargoes for shipment during the remainder of this year is approximately 23s. 6d. per cwt. c.i.f.

"About a week ago there was news from Chile of heavy surf at Junin having practically destroyed shipping facilities there for the next three months. Iquique and Pisagua are reported to have suffered in a lesser degree. Freights are steady at about 10os. per ton for the Bordeaux-Hamburg range, though 50s. per ton was recently accepted for shipment by liner to a U.K. port and 80s per ton by liner to a Continental port."

Bâle Chemical Industry

Review of the Year 1919

THE following translation of an article published by the Bâle Chamber of Commerce on the Bâle Chemical Industry for the year 1919 has been received by the Department of Overseas Trade from the office of the Commercial Secretary of H.M. Legation at Berne :—

Aniline Colours and Extracts

" The transitory period from war to peace time which began in 1918 still seems to exist. A return to anything like normal times does not seem to be within sight. It is true that import and export prohibitions have for the most part been abolished, but other difficulties have arisen, such as the difficulty of replenishing stocks and the difficulties of transport. In addition, foreign exchanges are also continually falling, which makes exports to countries with a low exchange almost impossible if it were not for the fact that the countries which require the goods are obliged to have them at any price. It is a fact that since last summer the demand for aniline colours has increased to such an extent that the colour works are quite unable to meet the demand. The output could be increased three or four-fold if it were possible to procure sufficient raw material, especially in the case of coal.

" The Bâle Chemical Works were extremely busy in supplying the demand coming from Northern France, Belgium, and Alsace, which countries had been partially devastated during the war, and the industries of which required large supplies of colours.

" The Bâle colour works were busy during the whole year, and were in fact rather hard pressed for time in delivery. At the beginning of August a local general strike broke out in Bâle. The men went on strike for nine days, during which time the colour works were at a standstill, the result being that the Bâle colour works got hopelessly behind hand with their deliveries. During last winter trade difficulties increased, partly owing to trade difficulties increased partly owing to strikes in England and partly owing to transit difficulties. Since the eight-hour working day has been introduced in Switzerland, Bâle has felt its effect. It is quite impossible to empty the trucks in the time available ; hence the delay in procuring empty trucks when wanted has increased immensely, and, in consequence, raw material cannot be procured in time quite apart from the fact that the works have to pay more for the use of the trucks. The desire to work harder has rather decreased than increased. During the year under review the works have increased their selection of dyes. Although the number of dyes offered at present does not anything like reach the variety brought on the market before the war, their number is fairly numerous, and speaks well for the work done by the colour works. It would lead too far to quote sale prices as, owing to the enormous drop in the rate of exchange, the prices in foreign countries had to be greatly raised, so that a comparison of the present prices with former prices would not give a correct picture of the state of the market.

Artificial Indigo

" The sale of artificial indigo suffered very much owing to the general trade depression immediately following the Armistice, during which time prices fell. It was then expected that competitors would put more goods on the market, which, however, did not happen, and in the spring a reaction took place. The manufacture of indigo was hampered during the year by all kinds of difficulties. Whereas formerly it was difficult to procure sufficient acetic acid it became increasingly difficult to procure aniline oil, the price of which had considerably risen. In spite of these difficulties, however, manufacturers were able to export twice as much as during the previous year, although a considerable competition had set in on the part of British and American competitors who were able to increase their export. Prices were about the same as in the previous year, but towards the end of the year they had to be raised owing to the enhanced cost of raw material and labour.

Manufacture of Extracts

" Manufacturers of extracts received sufficient orders and were able to procure their raw material in sufficient quantities. Buckthorn berries were procurable in larger quantities, and were of good quality. Tanneries were able to procure their usual raw materials, and only exceptionally were they obliged to use sumac extract and myrabolan extracts. Gallic extracts were in demand, and generally a good trade was done in tannin extracts.

Pharmaceutical Chemicals

" The year 1919 proved to be a satisfactory year for the chemical industry in general. The Armistice concluded at the end of 1918 altered the market possibilities, to which the industry had to adapt itself. Orders for pharmaceutical chemical goods for the armies in the field ceased, but during the beginning of the year orders arrived from Eastern European countries, the stocks of which had entirely disappeared. The unprecedented drop in the exchange of the newly-established countries, and the fact that German competition in the chemical-industries set in again proved to be a great drawback in developing trade to the East. The demand for chemical pharmaceutical goods in the world market gradually decreased owing to severe competition in America and the Western countries, so that prices gradually fell. The low rate of exchange in Germany made business extremely difficult. Chemical works had accumulated considerable stocks, which had to compete with stocks held by the various armies which were being sold out. The price of alkaloids kept fairly high. The difficulties in procuring raw material have to an appreciable extent decreased. Raw material sold out of army stocks could be bought fairly cheaply.

Pharmaceutical Specialities

" The above remarks apply chiefly to chemical pharmaceutical goods. The market for chemical pharmaceutical specialities—for instance, medicines sold in tablets and solutions—proved far less favourable. The medicines referred to are those with indications on their labels for their use for the information of the public. In the case of these medicines the effect of the low rate of exchange made itself still more keenly felt. The conditions of sale in the case of medical specialities cannot be altered so quickly, and the constant change in the conditions of sale give a great deal of trouble to the manufacturer. It may be added that if the price of a medical speciality be raised too much the public ceases buying it. The present international uncertainty with regard to legal rights concerning trade marks and trade names has made trade in medical specialities far more difficult than formerly. New countries have been formed in which legislation on these points has not as yet been clearly defined. In the older countries new laws were introduced during the war with regard to trade marks and patents belonging to enemy firms which caused general confusion everywhere.

" With regard to the year 1920 it is difficult to prophesy. One thing is certain, and that is that competition is very severe, and that times are difficult for Switzerland, as she is dependent on foreign countries for the majority of her raw materials, including coal, and also owing to the ever-increasing cost of production."

The Present State of the Market

In addition to the above report the following supplementary information was received from the Commercial Secretary :

" As to the state of the market at present there has been a slump in some parts of the world, especially in the East, which makes itself felt in the sales. It is, however, considered that the market will recover, as the demand for aniline colours on the part of the textile industries in the whole world is enormous. At present the demand for aniline colours is larger than the available supply, and it is anticipated that business will soon be normal again and remain so for some time to come yet.

" The price of dyes has not fallen recently although the price of raw materials of minor importance has shown a tendency to fall. But raw materials of greater importance have rather been inclined to rise in price, and consequently prices for finished colours have remained approximately on the same level during the last half year.

" It seems that the Bâle Chemical Works have greatly increased their staff and the number of hands they employ. This is attributed to the fact that a good many intermediates which before the war could be bought in the open market are now manufactured in the Bâle chemical works."

South Wales Coal and Coalfields

By Mr. S. R. Illingworth

IN a paper read before the recent meeting of the British Association at Cardiff Mr. S. R. Illingworth said that the South Wales coalfield lay in a basin 920 square miles in area, of which the coal-bearing area extended under Carmarthen Bay. The coal-bearing measures were divided into three zones—the Upper Measures or Llantwits, the Pennant Grits or Middle Series, and the Shale or Lower-coal Series. The most valuable portion of the measures was contained in the last-named series, which extended from the Farewell Rock to No. 2 Rhondda Seam. The Pennants extended from the No. 2 Rhondda to No. 3 Llantwit, and above these occurred the Llantwit Series, which in the main comprised the two outliers in the east in the Blackwood Basin and at Caerphilly. It was estimated that Seams of one foot or over within 4,000 feet of the surface had an aggregate thickness of 28 feet in Pembrokeshire, 47 to 83 feet in Carmarthen, 70 to 120 feet in Glamorganshire, and 38 to 48 feet in Monmouthshire. These seams contained 31 per cent. of steam coal and 22 per cent. of anthracite.

New Classification

The classification of South Wales coal had been investigated, the lecturer said, by Mr. C. A. Seyler, and a new classification developed which, in addition to differentiating between the various types of coal in this coalfield, was of great value in determining the nature of a coal, whatever its source, from a consideration of its ultimate composition. South Wales was especially famous for its steam coals and anthracites. Mr. Seyler differentiated six classes of steam coal: semi-anthracite, sub-carbonaceous, semi-bituminous, sub-bituminous, and pseudo-carbonaceous. The famous Aberdare Admiralty steam coals were of ortho-carbonaceous and semi-bituminous types. The finest qualities belonged to the first named species; they were possessed of small coking qualities sufficient for the coal to open out on the bars and prevent the small working through. The dry steam coals all belonged to the genus and species of anthracites and carbonaceous coals, consequently they were low in hydrogen, and possessed no coking power. The coals utilised for coke manufacture belonged mainly to the meta, some to the ortho-bituminous series, but to-day many of them were of the semi-bituminous genus, *i.e.*, sub-meta and sub-ortho-bituminous coals. It was interesting to note that the Welsh steam coals were higher in carbon and lower in hydrogen than the coking coals, whilst the North Country, Scotch, and Midlands free burning steam coals were in general of higher hydrogen and lower carbon than the coking coals, *e.g.*, the latter were intermediate in nature between the Welsh and other free-burning coals of the United Kingdom.

The salient feature of the distribution of the various types of coal within the South Wales coalfield was, Mr. Illingworth said, that at any particular place in general the passage from the higher to lower seams was concomitant with a decrease in the volatile matter of the coals. The upper seams (Llantwit's) ranged in volatile from 37 to slightly over 40 per cent., the Pennant Grit seams ranged from 19 to about 37 per cent., whilst the lower seams varied from 5 to about 20 per cent. volatile. The figures given were very approximate, since another very remarkable feature of any particular seam was that on the eastern borders of the coalfield all the coals tended to be of the bituminous species. As one followed any seam in a westerly direction there was a gradual diminution in volatile matter, a consequent decrease in hydrogen, and an increase in carbon, until finally the coal in the east was of the anthracite species. A similar change was evident in passing along any seam from the N.E. to S.W.; the coals increased in volatile matter in this direction; seams which were of a carbonaceous or semi-bituminous nature in the N.E. became highly bituminous along the south crop of the coalfield.

Research Work at Treforest School of Mines

During the past two years Mr. Illingworth said he had been engaged in research at the School of Mines, Treforest. The results of the work so far published were contained in three papers in the *Proceedings* of the Institute of South Wales Engineers, Vol. 35, No. 2, and Vol. 36, No. 1. These investigations were concerned with that interesting class of Welsh coals which gave rise to coke of one type or another. It was found that the temperature of coke-formation increased with increase of the carbon-hydrogen ratio, and ranged from 380C. for the gas type of coals to approximately 470-500C. for the semi-bituminous coals. Recently he had begun an investigation of other typical coals of South Wales, the object of which was to attain some insight into the fundamental differences of these coals. The work was largely correlated with the problems attacked by Seyler and also by Strahan and Pollard. Inasmuch as a knowledge of the fundamental differences of the typical coals would shed light on their classification, and since the coals so far examined were drawn from different places in the 9-foot seam, the information obtained should assist in the elucidation of the gradual change in the nature of the coal in an east to west direction; that was, it should assist toward a solution of the problem of the origin of anthracite.

Concurrent with this chemical investigation of the coals, geological work was being carried out by Professor Knox, and it was hoped that correlation of the results would shed further light on the origin of coal. The work recorded revealed a graduation in the properties of the coal in the 9-foot seam in an east to west direction; tentatively the view might be put forward that these changes arose from the elimination from the matrix from which the coal was formed of the protein and cognate substances which constituted the resinic portions of the coal. This elimination had taken place due to bacterial agency, either in the original matrix *in situ*, or in regional swamps; and subsequently selective deposition of the altered matrix had taken place, the lightest portions being carried farthest, and a graduation in density of the deposited mass had resulted from shore line out to deeper water, due to variations in density of the matrix altered according to the degree of bacterial change. The anthracites appeared to be composed of highly comminuted matter, but as yet no satisfactory micro-sections had been made. It was possible that the most decayed portions of the matrix were the lighter, due to gases occluded during the change. They might be also the more "spongy" and thus less resistant to pressure, which, arising from deposition of overlaying sediments, would press the mass into one of greater density; for the anthracites were of the greatest density. Or it might be that the changes occurred after sedimentation. But these points and the relation of the distribution to physical conditions of sedimentation had yet to be cleared up.

Discussion

The Paper was followed by an interesting discussion in which Professor Bone, among others, took a prominent part.

Mr. Illingworth, in reply to Professor Bone, first thanked him for his kind invitation to join the Fuel Economy Committee, and accepted the honour conferred on him. Mr. Illingworth asked Professor Bone how much of the coal in question was extracted by the neutral solvents. Professor Bone replied 4 to 5 per cent.

In reply, Mr. Illingworth called attention to Dr. Wheeler's definition of the α, β and γ compounds as given in the monograph on "The Constitution of Coal." The α compounds comprised that portion of a coal insoluble in pyridine. The β (cellulosic) were compounds soluble in pyridine but insoluble in chloroform; they contained comparatively large amounts of oxygen and relatively small quantities of hydrogen; moreover, they had a smaller percentage of carbon than the original coal. These compounds did not melt, they yielded about 30 per cent. volatile matter, which was composed of gaseous compounds rich in carbon dioxide and water; the liquid portions contained little hydrocarbon, and large amounts of hydroxy compounds of a phenolic nature. This behaviour recalled that of cellulosic substances. The resinic or gama compounds comprised that portion of a coal soluble both in chloroform and pyridine. These substances were rich in hydrogen and carbon, contained very little oxygen, and were emphatically differentiated from the previous substances in so much as they melted and became fluid at temperatures around 150-200°C. They gave rise to high yield of volatile matter, which consisted mainly of hydrocarbons, accompanied by very small amounts of hydroxy or oxygenated substances. This behaviour recalled that of the natural resins, and lead Dr. Wheeler to define them as resinic. He (Mr. Illingworth) did not visualise them as acid anhydrides, carboxylic acids, lactones, or of the same chemical nature as damar, copal, kauri or other natural resins. In his paper he suggested they might be protein residues.

"In my several researches," Mr. Illingworth continued, "I *have* shown that the proportions, stability and volatility of these compounds determine the nature of the coal, its commercial usages, the nature of its coke, &c. Coke formation is determined by the resinic constituents, throughout my researches; so long as 5 per cent. of this class of substance is present the coal gives rise to a coke. I join issue with Professor Bone on his contention that the resinic bodies are not the coking principle, and my remarks are also made in a spirit of friendly criticism, for truths can only arise by straightforward discussion between rival views. I would direct Professor Bone's attention to the tables which give the results of the pyridine and subsequent chloroform extractions of the coals and their residues considered in this research. Take the Y.O. coal, it is evident that this coal must be heated to a minimum temperature of 350-400°C. before depolymerisation takes place, and the resinic substances are rendered soluble; it will be noted that the original coal shows practically nothing as soluble in pyridine, and I might add that heating this coal with pyridine for three weeks in sealed tubes only gives 0·8 per cent. pyridine soluble. Moreover, the Welsh coking coals all exhibit enhanced figures for the amount of pyridine soluble constituents after they have been slightly decomposed (say, 1 per cent.), *i.e.*, after they have become depolymerised. In the case of the No. 2 Rhondda, extraction of the virgin coal with pyridine removed 4·93 per cent. resinic compounds, the extracted coal had not lost its coking qualities, but a further 6 per cent. of resinic compounds was found in this residue when the coal had been heated for half-an-hour at 450°C. In this connection I would refer to my several papers in the *Proceedings* of the Institute and in the *Journal of the Society of Chemical Industry*, where it will be seen that every coal or residue therefrom which gives a coke contains as a minimum 5 to 6 per cent. of resinic substance. I contend I have established that the resinic matter is the coke-producing ingredient of coal; if it is not, what is? It is possible that this type of substance will ultimately be resolved into several individual compounds, but is it not better to use what knowledge of the coal complex we possess and progress to generalisation, than to wait perhaps generations till chemical individuals are isolated, which will only alter our generalisations in detail and not in principle? To sum up my remarks, I contend that my evidence justifies and proves the view that to the resinic bodies must be ascribed the coking principle of coal. Further, I would suggest to Professor Bone that he had not by neutral solvents removed the highly polymerised resinic matter from the coal he cites, and the coking qualities of the residue from the extraction are due to these last-mentioned resinic substances. Wheeler's terminology may be unfortunate from one standpoint, yet it is decidedly symptotic. I do not care if we call them Tom, Dick and Harry, so long as we realise they are three *classes* of substance into which we can resolve the coal complex, each class typical, yet in the various species of coal they differ in stability, volatility, &c."

SOUTH METROPOLITAN GAS CO.—The company has issued a circular to its shareholders in which it is stated that, in view of the recent Act obtained by the company requiring its general meetings to be held annually, the meeting convened for August 11 did not take place. The dividend is the same as that for the preceding six months, and is the maximum allowable under the provisions of the Government Act passed two sessions ago, which was intended to afford relief from the conditions imposed by previous sliding-scale legislation. That relief was inadequate, the shareholders having suffered loss in dividend to the extent of over half a million sterling since the outbreak of war, irrespective of the heavy taxation levied on the remainder. With the object of getting this grave injustice remedied the directors promoted a Bill in Parliament, and the principles for which they contended were completely vindicated and accepted by Committees of both Houses of Parliament. The result is a return at 5 per cent. per annum in respect of the issued and 6 per cent. per annum in respect of the unissued ordinary stock of the company, which rates, under all circumstances, the shareholders will henceforth be entitled to divide. Profits earned beyond this will be divisible in the proportion of three-fourths to the gas consumers by way of reduction of price, and one-fourth in equal parts to the shareholders and co-partners employees.

Reviews

HANDBOOK OF PHYSICS AND CHEMISTRY. Herbert E. Corbin, B.Sc. J. & A. Churchill, London. Pp. 469. 15s. net.

It is a very ambitious thing to attempt to give an account of the systems of Physics and Chemistry in a matter of five hundred pages or so, and when we find that the book includes both Inorganic and Organic Chemistry and touches on the subjects of dialysis, osmosis, radioactivity, the glycerols, carbohydrates and aromatics the scheme seems doubly hardy.

It is to the credit of Mr. Corbin that he has really done more than given a resumé of the general field, and the fact that the book is in its fifth edition seems to indicate that it has been appreciated elsewhere.

We are glad to see that in the chapter on Frictional Electricity the old idea of "bound and free" charges is not mentioned, and that the modern explanation of the several phenomena of induction, *i.e.*, by the conception of lines of force in a state of tension or contraction, is given prominence. However, it is necessary to draw attention to a similar point in the Chemistry section where such good commendation cannot be given. After having touched on the fundamentals of Avagadro's hypothesis and the gas laws, from which the student should have gathered that the molecule of hydrogen contains two atoms, would it not have been advisable to have set at the top of the chapter on hydrogen the formula as H_2 and not as is done in the book—simply H? The same thing occurs in the appendix, but in the equations for the preparations of hydrogen and oxygen the symbol is printed, rightly, H_2.

This cannot be called a mistake, but it is an inconsistency. It is also advisable to drive the fact into the brain of the inexperienced student as often as possible, since it is of fundamental importance in those sort of calculations, set in matriculation and similar examinations, on interacting gases. The formula, or more precisely, the symbol, for the gas Hydrogen (and all other di-atomic gases for that matter) should always be printed H_2.

Perhaps the best section of the book is that on Organic chemistry, for if the student has mastered the preceding chapters he will be starting on the usually troublous study of the carbon compounds with a firm foundation.

The very important sections of the subject, such as the relation between the volumes of gases under different conditions of temperature and pressure, the relation between the weight and the volume of gases, formula from percentage composition, and an account of the oxidising and reducing compounds which is of so much importance in the study of Organic chemistry are placed in an appendix. This is reasonable in the case of the first mentioned, but we should suggest that the appendix on the oxidising and reducing agents be placed at the end of the inorganic section in the next edition. so that the student has a knowledge of their properties when starting the study of Organic chemistry.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Ottawa ...	Paints; oil; varnishes; glass ...	309
Vancouver ...	Paint; aluminium paint	310
Brussels ...	Heavy oils	321
Cologne ...	Vegetable oils; fats; wax; shellac	326
Barcelona ...	Aniline colours; varnishes; glues; chemical products.	329
Canada ...	Rapeseed oil. Replies to the Canadian Government Trade Commissioners Office, Portland House, 73, Basinghall Street, London, E.C. 2.	
Mexico ...	Chemicals; paints	—
Belgium ...	Chemical Manures	346
Spain (Almeria)	Nitrates; superphosphates; sulphates	353
Toronto ...	Chemicals	344

From Week to Week

A graduate research studentship at Emmanuel College, Cambridge, has been awarded to Mr. C. H. Spiers for research in stereochemistry.

A number of abandoned oil wells in various parts of Alberta have been taken over by the IMPERIAL OIL COMPANY, and development work will be proceeded with.

DAMAGE ESTIMATED AT £350,000 was caused by a fire which broke out in the iron and steel works at Munkfors, north of Lake Wener, Sweden, on Saturday, September 4.

BRITISH GLASS INDUSTRIES, LTD., is among the companies whose offices have been removed with the Commercial Bank of London to the bank's new building in Gracechurch Street.

The death has occurred in his native town, Agen, of M. DUCOS DU HAURON, the inventor of indirect colour photography. M. du Hauron, who was 83 years of age, is stated to have died in the utmost poverty.

The Council of the SOCIETY OF DYERS AND COLOURISTS announce that Lord Moulton will give his Presidential Address in Bradford on October 15. Further details will be announced later.

Pending the settlement of business organisation, it is asked that all enquiries with regard to DEKALINE, the new substitute for turpentine, should be addressed to Lt.-Col. Stanley Smith, O.B.E., 33, Compton Road, Wimbledon, London, S.W. 19.

Having heard the views of the professorial staff, a subcommittee has recommended the SWANSEA EDUCATION AUTHORITY to erect as quickly as possible semi-permanent buildings at Singleton for the departments of chemistry, metallurgy and physics of the new University College.

The hon. secretary of the WEST RIDING SECTION OF THE SOCIETY OF DYERS AND COLOURISTS announces that the undermentioned have promised to lecture during the session 1920-21: Dr. S. A. Shorter, Dr. L. L. Lloyd, Mr. H. Hey, Dr. E. E. Fyleman, Mr. M. Fort, Mr. J. Huebner and Mr. F. Smith. The titles and dates of the lectures will be announced later.

A cablegram received by the Standard Bank of South Africa states that experiments and TESTS IN CONNECTION WITH ACETOL, a petrol substitute, are reported to be satisfactory. The chief ingredients are alcohol from sweet potato and acetylene. The Minister of Finance draws attention to the necessity of grading coal exports.

The Newfoundland Legislature at its last Session enacted measures enabling two PULP AND PAPER COMPANIES, one British and one Norwegian, to establish industries of this character within the island. The British company is to operate at Bonne Bay, midway up the West Coast, and the Norwegian company at Bonavista Bay.

A contractor's van, laden with CARBOYS OF SULPHURIC ACID, collapsed in West Ham-lane, Stratford, last week. Some of the carboys were smashed, and the fumes caused a stampede of passers-by. The fire brigade was called and washed the acid away, but when an attempt was made to get the cart off the tramway metals about a dozen carboys fell out, and the washing away process had to be repeated.

It is announced by the OIL TRUST, LTD., that in association with the Havana Oil Co., it has, after lengthy negotiations, secured a large interest in extensive areas situated in the petroliferous zone of Rumania. The properties have been examined by Mr. Lewis Hamilton and Messrs. A. Beeby Thompson and Partners, both of whom have reported favourably on the property.

Mr. M. J. R. MORRIS, of Swansea, has been awarded the premier honours of the metallurgical department of the Royal School of Mines, London, for the year, taking the A.R.S.M. in the first class, and has been presented with the Bessemer medal in metallurgy. Mr. Morris has been elected to a post-graduate scholarship, value £400, tenable at Yale University, and sails for the United States this month.

A number of additional general regulations made by the Home Secretary under the Coal Mines Act, 1911, and issued on Tuesday, contain important provisions for the PREVENTION OF DANGER FROM COAL DUST and spontaneous combustion, for rescue work and other matters. The precautions against coal dust come into force on January 1, 1921, though where it is found impracticable to obtain the necessary plant, power is given to the Divisional Inspector of Mines to allow a reasonable extension of time.

The CENTENARY OF H. ŒRSTED'S DISCOVERY of electromagnetism was celebrated in Copenhagen last week. Meetings were held in the Town Hall and the University, at which many physicists, chemists, and electrical engineers from Norway and Sweden were present. At the same time, he was commemorated as the founder of the Polytechnic High School in Copenhagen. The occasion was taken to publish some of Œrsted's letters under the title "Correspondance de H. C. Œrsted avec Divers Savants."

Among the passengers who sailed by the White Star Dominion liner, Canada, from Montreal on Thursday were a party of some 25 representative British chemists, who are to attend the ANNUAL CONVENTION AT ST. LOUIS of the United Drug Company, which recently took over the control of Boots' Pure Drug Company, Limited, and the various branches of Boots, chemists. The party will include Sir Thomas and Lady Robinson, of Dublin; Mr. Jeffrey Poole and Mr. J. W. Atkinson, of Birmingham; Mr. C. Dean, Bury; Mr. H. Holt, Rochdale; Mr. Whitfield, Scarborough; Mr. Norman Heath, Liverpool; Mr. E. T. Rich, Swansea; and Mr. F. D. Spencer, Stratford-on-Avon. About 5,000 chemists from all parts of the English-speaking world will take part in the convention.

In our issue of August 7 we gave a short account of the SCHOOL OF RUBBER TECHNOLOGY to be re-established at the Northern Polytechnic, Holloway, London, N. The school is to be opened on Monday, September 27, and Dr. P. Schidrowitz has been appointed Director of the courses. There will be, as already stated, day and evening courses, designed mainly to train those who have already acquired a thorough knowledge of chemistry and physics, and who wish to take up responsible positions of a scientific and technical nature in rubber factories. The school will be in close touch with the industry, as it will be under an advisory committee composed of representatives of the manufacturers, producers, merchants, rubber engineers, &c.

The 1920-21 session of the HULL CHEMICAL AND ENGINEERING SOCIETY will open on Tuesday, October 5, with a soiree, which will be followed by fortnightly meetings, when papers will be read on "The Chemistry of Foods," "Carbonisation of Coal," "Evaporators and Evaporation," "Legal Chemistry," &c. Arrangements have also been made for members to visit various works, including those of J. H. Fenner & Co., belting manufacturers, Marfleet; the British Oil & Cake Mills (Eagle Oil Mills), and the British Gas Light Co., Sculcoates. The society was formed to promote scientific and social intercourse among chemists and engineers, and membership is open to persons over eighteen years of age engaged in either the chemical or engineering profession.

Cornish Tin: New Proposal by the J.I.C.

AT a private meeting of the Joint Industrial Council of the Tin Mining Industry at Camborne on Friday, August 27, a proposal for the nationalisation of the mines was considered on a motion put forward by Mr. Dan Hillman (district secretary of the Dockers' Union), seconded by Mr. Arthur Wilkins (district organiser of the Dockers' Union). The resolution subsequently communicated to the Press was in the following terms:—"That the Joint Industrial Council, having heard the lengthy reply from Sir Robert Horne to the recent deputation, and understanding that there can be no financial assistance given to the industry on its present basis of management, we therefore call upon the Government to take over all the Cornish tin mines, nationalise the minerals, and set up a central management board, consisting of one-half of the present mine managers and one-half of tin miners and surface workers." The meeting was presided over by Mr. J. Harris (Workers' Union), and Mr. W. W. Uglow (Labour). Mr. C. V. Thomas (Camborne), and Lieut.-Col. F. F. Oats (Levant) were among others who took part in the nationalisation discussion. The Council decided to refer the question to a future meeting, when it was anticipated a larger number of mine-owners would be present.

References to Current Literature

British

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French

ELECTROCHEMISTRY. The Soderberg electrodes. *J. de four Electrique*. August 1 and 15, 1920, pp. 101-3. A special article on M. Soderberg's new invention.

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ALCOHOLS. Catalytic oxidation of alcohols by metallic oxides and divided metals. M. J. B. Senderens. *Ann. de Chimie*, May-June, 1920, pp. 266-283.

COAL, ETC. Studies on coal and gas produced by its distillation. M. Leo. Vignon. *Ann. de Chimie*, May-June, 1920, pp. 284-301.

ANALYSIS. A review of analytical chemistry. André Kling and Arnold Lassieur. *Chem. et Ind.*, August, 1920, pp. 55-68. This article is exceedingly interesting, being a co-ordination of current lines of analytical work.

COKE. The evolution of the metallurgical coke industry. Charles Berthelot. *Chem. et Ind.*, August, 1920, pp. 69-80. This instalment deals with the industry in England, France and Germany.

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ALLOYS. Some theoretical principles of alloying. R. J. Anderson. *Chem. and Met. Eng.*, August 25, pp. 317-320.

COKE. Progress in the by-product coke industry. C. R. Bellamy. *Chem. and Met. Eng.*, August 25, pp. 321-326. (A paper read before the American Institute of Chemical Engineers, Montreal, June 29, 1920.)

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German

IRON. Determination of small quantities of iron as theocyanate. R. Willstater. *Ber.*, 1920 (53), pp. 1152-1154.

Use of iron basins in analysis. H. Seatz. *Z. Angew Chem.*, 1920 (33), pp. 156-7. Useful in sulphide fusions where platinum or silver vessels are unsuitable.

EXPLOSIVES. Dicyanomide as explosive. J. Baumann. *Chem. Zeit.*, 1920 (44), p. 474. The ammonium nitrate mixture can be ground without danger, and is particularly suitable for mining purposes.

Miscellaneous

ACIDS. On the crystallisation of acetilsalycilic acid. G. Cappelli. *Giorm. de Chem. Ind.* (Italy), pp. 378-380. August, 1920.

NITRO COMPS. Examination of nitro compounds by means of titanium chloride and sulphate. C. F. van Duin. *Rec. Trav. Chem.*, 1920 (30), pp. 578-585. The use of titanium sulphate instead of the chloride is recommended for feebly substituted nitro comps. by Knecht's method.

Tariff Preference for Cyprus

THE Board of Trade are in receipt of a copy of the Customs, Excise and Revenue Law, 1920, which makes provision for a tariff preference in Cyprus in respect of goods consigned from and grown, produced or manufactured in the British Empire. For the following (amongst other) goods the schedule of preferential rates is :—

Matches	Two-thirds of the full rate.
Soaps	
Dyes	
Chemicals.....	Five-sixths of the full rate.
Drugs, &c. ...	

There are also several clauses defining " British manufactured goods," and a full text of the Order may be consulted in the *Board of Trade Journal* of August 26.

Patent Literature

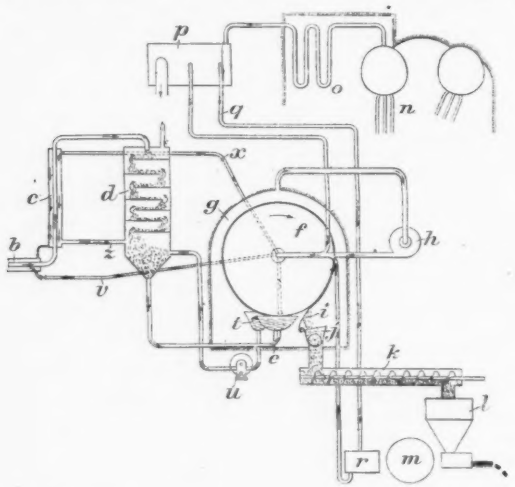
Abstracts of Complete Specifications

149,038. FILTERING OR AND MIXING OILS AND OTHER LIQUIDS, APPLIANCES FOR. R. H. Cox, 103, Freer Road, Handsworth, Birmingham. Application date, April 30, 1919.

A centrifugal filtering machine comprises a cylindrical drum rotating on a horizontal axis. The cylindrical surface is composed of inner and outer gauze or perforated metal elements enclosing a filtering medium consisting of felt, flannel or the like. The gauze elements consist of detachable lengths of material which are wrapped around the cylinder, and have their meeting edges provided with connecting fittings, so that they may be secured by pins or bolts. The two end discs are provided with flanges for supporting the inner gauze, and are connected by tie-bars. The drum is enclosed in a casing, and its shaft at one end is hollow to provide for the admission of liquid into the drum.

149,055. DRYING PROCESSES AND APPARATUS THEREFOR. T. Boberg and Techno-Chemical Laboratories, Ltd., "Fairlawn," Clarence Road, Clapham Park, London, S.W.4. Application date, May 3, 1919.

The apparatus is for dyring disintegrated solid material, such as wet peat. The material is continually applied in a thin film to a hot surface, and the vapour given off is compressed to raise its temperature a few degrees and then returned to the opposite side of the evaporating surface as the heating medium. Raw peat containing about 94 per cent. of water is delivered by a pump through a contact heater, *b*, where it is heated by hot water to about 20°C. The peat then passes through a surface heater, *c*, heated by steam, and thence to a direct contact heater, *d*, from which it passes to *a* trough, *e*, in



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a casing, *g*. The peat is picked up by a rotating drum, *f*, into which steam is delivered at about 105°C. by a compressor, *h*. The vapour given off from the surface of the drum at about 100°C. is drawn from the casing *g* into the compressor *h*, where its temperature is raised by compression. The dried material is removed by scrapers, *i*, and passes through a hopper, *j*, and conveyor, *k*, to the hopper *l* of a briquetting press, *m*. Steam is generated in a boiler, *n*, at about 216°C., and further heated in a superheater, *o*, to 360°C., from which it passes to a turbine, *p*, which supplies power to the system. Steam is taken from the turbine at 10 kg. per square centimetre by pipe, *q*, for the briquetting press *r*, the exhaust from which at 105°C. passes into the drum *f*. A further supply of steam at the same temperature is delivered by the pipe *s* to the drum *f*. An overflow trough, *t*, returns any surplus peat through the pump *u* to the direct heater *d*. Condensed water from the drum *f* passes by a pipe, *v*, to the heater *b*. Steam passes from the drum *f* by a pipe, *x*, to the steam heater *c*, and any remaining uncondensed passes by the pipe *z* to the heater *d*, through which it passes upwards in a zigzag course. Material which does not readily adhere to the drum *f* may be retained in contact with it by some form of supporting screen or moving band. It is found that an effective drying may thus be obtained by the use of a heating medium only a few degrees above the temperature of the material to be dried.

149,085. TUNNEL OVENS AND LIKE STRUCTURES. Dressler Tunnel Ovens, Ltd., Argyle Works, Carters' Crossing, Fenton, Stoke-on-Trent, and C. Dressler, 9, Wetherby Terrace, Earl's Court, London. Application date, May 14, 1919.

The tunnel oven is of the type in which goods or materials pass first through a heating zone and then through a cooling zone. The cooling zone is surrounded by longitudinal tubes, through which water is circulated by a pump in the opposite direction to the movement of the hot material. The heat passes into the water by radiation, and may be used for generating steam. The heating and cooling zones of the oven are separated by a refractory partition having an opening just large enough to admit the passage of the material.

149,086. COAL AND OTHER MATERIALS CAPABLE OF BEING DISTILLED, VAPORISED OR DECOMPOSED BY HEAT, TREATMENT OF. Dressler Tunnel Ovens, Ltd., Argyle Works, Carters' Crossing, Fenton, Stoke-on-Trent, and C. Dressler, 9, Wetherby Terrace, Earl's Court, London. Application date, May 14, 1919.

Coal is passed continuously in moving trucks through a horizontal retort heated by means of combustion chambers along its side walls to a temperature which gradually increases from one end. Transverse partitions project downwards to the level of the top of the coal, so as to form a number of compartments, from which fractional distillates evolved from the coal may be separately drawn off.

149,095. AMMONIUM NITRATE, MANUFACTURE OF. F. A. Freeth, Heyesmere, Sandiway, Cheshire, and H. E. Cocksedge, 7, Dyar Terrace, Winnington, Cheshire. Application date, May 20, 1919.

Ammonium sulphate and sodium nitrate are allowed to react in such quantities as to produce ammonium nitrate and a precipitate of sodium sulphate. The latter is removed and the solution treated with calcium sulphate, which removes sodium sulphate in the form of the double salt of sodium and calcium. The solution may then be cooled without any substantial dilution to yield a precipitate of substantially pure ammonium nitrate. The proportions of the salt used are given.

Note.—No. 130,968 (U.S. Industrial Alcohol Co.), which is now accepted, was abstracted when it became open to inspection under the International Convention; it relates to a continuous process for manufacturing esters. *See* THE CHEMICAL AGE, Vol. I, page 504.

International Specifications Not Yet Accepted

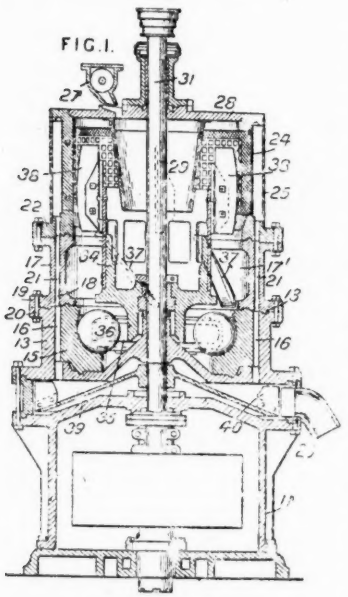
145,511. CELLULOSE ACETATE. Badische Anilin & Soda Fabrik, Ludwigshafen-on-Rhine, Germany. International Convention date, February 9, 1914.

A solution for lacquering or for producing artificial silk or films is obtained by dissolving cellulose acetate (soluble in acetone) in a fully hydrogenised mono-cyclic ketone, such as cyclo-hexanone or methyl-cyclo-hexanone mixed with a solvent or diluent, such as alcohol, acetone, ethyl acetate or benzene.

145,522-3. DYES. Akt.-Ges. für Anilin-Fabrikation, Treptow, Berlin. International Convention date, January 21, 1914.

145,522. Azo compounds obtained by coupling diazo compounds with N-ethylarylamines, with or without an admixture of aromatic amines or substances yielding them, such as nitroamino or azo compounds, are heated with a sulphurising agent to obtain sulphuretted dyes. Examples are given in which *p*-nitrobenzene-azo-ethyl-α-naphthylamine or other similar compound is heated with sulphur. The products are treated with sodium sulphide to stabilise them. Yellow-brown shades are produced on cotton.

145,497. GRINDING AND CRUSHING MILL. Fuller-Lehigh Co., Fullerton, Pa., U.S.A. (Assignees of J. W. Fuller, Catasauqua, Pa., U.S.A.) International Convention date (U.S.A.), June 1, 1918.



Material to be ground is fed through the funnel 29 and falls through a frame, 34, carried by the shaft 31 into the grinding chamber. The grinding balls 36 are driven by radial arms 35, and the material is ground between the balls and the ring 15. The ground material is drawn upwards by a current of air due to the fan 38, and the insufficiently ground particles separate in the chamber 17. A number of inclined lifting blades, 37, are carried by the frame 34, mounted on the shaft 31. The finer particles pass outwards through the screen 24 and then downwards through the passage 16 to the chamber beneath the ring 15, from which they are discharged through a spout, 26, by a fan, 40.

145,523. Aminoazo, diaminoazo, nitroaminoazo, nitrooxyazo or amino-oxyazo compounds are mixed with C-alkylated diamines of the benzene or naphthalene series and heated with sulphurising agents to obtain sulphuretted dyes. Examples are given in which products are obtained by heating with sulphur mixtures of *m*-toluylenediamine with aminoazobenzene, benzene-azo-β-naphthylamine, benzene-azo-α-naphthylamine, *p*-nitrobenzene-azo-α-naphthylamine, or *p*-nitrobenzene-azo-β-naphthylamine, and a mixture of 4-α-naphthylamino-2-aminotoluene with benzene-azo-α-naphthylamine. The products are treated with sodium sulphide to solubilise them. Yellow-olive to dark brown shades are produced on cotton. Other examples are also given.

145,524. CELLULOSE ESTERS. Akt.-Ges. für Anilin-Fabrikation, Treptow, Berlin. International Convention date, July 11, 1914. Addition to 10,706/12.

Cotton is treated with a mixture of nitric acid and nitrobenzene and then washed and dried. The product is treated with a mixture of glacial acetic acid, acetic anhydride and bromine or other catalyst. The cellulose acetate is separated by dilution with water and may then be hydrolysed.

145,525. CELLULOSE ACETATE. Akt.-Ges. für Anilin-Fabrikation, Treptow, Berlin. International Convention date, May 30, 1918.

Cellulose or its derivatives may be acetylated in two stages, a catalyst consisting of bromine and fused zinc chloride being used in the first stage. The acetylation is then completed by adding sulphuric acid with or without glacial acetic acid and acetic anhydride. A complete solution of the cellulose is thus obtained, and the acetate may be separated by dilution with or without acetone. The acetate may be hydrolysed.

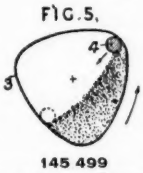
145,581. OXYALDEHYDES. Akt.-Ges. für Anilin-Fabrikation, Treptow, Berlin. (Assignees of H. Haakh, Dessau, Anhalt, Germany.) International Convention date, February 6, 1918.

Phenols or their derivative are treated with formaldehyde, a nitroso compound and an acid condensing agent to produce oxyaldehydes. The nitroso compound may be nitrosodimethylaniline, nitrosodiethylaniline or nitrosophenol, and the condensing agent may be hydrochloric acid. Examples are given for preparing salycylic aldehyde, *p*-oxybenzaldehyde 2-oxy-5-methyl-benzaldehyde, anisic aldehyde, vanillin, protocatechuic aldehyde, &c.

145,582. FERTILISERS. Akt.-Ges. für Anilin-Fabrikation, Treptow, Berlin. International Convention date, March 16, 1918. Addition to 146,259.

A hot, strong solution of ammonium nitrate is mixed with cold potassium sulphate or a mixture of rock salt and calcined magnesium sulphate, when the mixture solidifies and may be ground.

145,599. PULVERISING MILLS. H. Cramm, 233, Hermannstrasse, Neukolln, Germany. International Convention date, May 15, 1914.



A rotating drum, 3, provided with a door, is mounted on standards, and contains one or more grinding rollers, 4, of the same length as the drum. The drum is not cylindrical, but has three or more flattened sides, so that the rollers are lifted to a considerable height before dropping, without the aid of lifting ribs.

145,600. COPPER AND NICKEL. P. Goldberg, 59, Treptower Park, Treptow, Berlin. International Convention date, July 9, 1918.

A solution containing, say, 135 grams of crystallised cupric chloride per litre of 25 per cent. hydrochloric acid is electrolysed, using an anode of copper-nickel alloy. Copper and nickel dissolve from the anode as sub-chlorides, and no copper is deposited till most of the cupric chloride is reduced. When sufficient copper has been deposited to reduce the proportion in the solution to 4 per cent., chlorine is added, so that the copper deposited on the cathode is equal to that dissolved from the anode. Nickel may be recovered from the solution when sufficiently rich in nickel.

145,610-1. CELLULOSE, TREATING. F. Moeller, 1, Worthstrasse, Cassel, Germany. International Convention dates, August 22, 1918, and February 24, 1919.

145,610. Cotton, paper or other cellulose product is hardened and made waterproof by thionyl chloride in chloroform, carbon tetrachloride, benzol, &c., or by exposure to thionyl chloride vapour. The product is afterwards washed with water or alkali, or treated with ammonia gas.

145,611. This is a patent of addition to 145,610 above. The same process may be applied to cellulose-containing materials such as wood, cork, straw, jute, hemp, linen, flax, artificial silk, and to cellulose hydrate, hydro-cellulose, oxycellulose, starch or dextrin, or fabrics treated with these.

145,614. AMINOPHENOL DERIVATIVES. E. Kolshorn, 39, Ehrenbergstrasse, Dahlem, Berlin. International Convention date, June 13, 1919.

P-aminophenol or its alkyl ethers is treated with α-monochlor-hydrin or glycide in the presence of a neutral solvent to obtain *N*-dioxypropyl-*p*-aminophenol and its alkyl ethers. The former may be used as a photographic developer.

145,652. FRACTIONAL DISTILLATION. Rosanoff Process Co., Vanadium Building, Forbes Street, Pittsburg, Pa, U.S.A. (Assignees of H. F. Perkins, Forbes Street, Pittsburg, Pa., U.S.A.) International Convention date, July 2, 1919.

In distilling petroleum for the production of particular distillates such as gasoline, the vapour is cooled to a temperature below the initial boiling point of the residue to be obtained in the still, but above the end boiling point of the distillate required. The uncondensed vapour is dephlegmated in such a way that the vapour delivered by the dephlegmator to the condenser is at the temperature of the end boiling point of the distillate required.

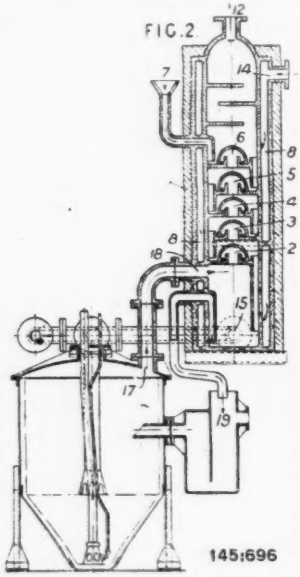
145,732. ACID-PROOF RECEPTACLES. F. Krupp Akt.-Ges., Essen, Germany. International Convention date, June 17, 1918.

The receptacle has inner and outer walls of acid-proof iron with an intermediate layer of lead.

145,743. ALKYLANILINES. E. I. Du Pont de Nemours & Co., Wilmington, Del., U.S.A. (Assignees of A. E. Houlsham, 1106, Greenhill Avenue, Wilmington, Del., U.S.A.) International Convention date, July 7, 1917.

Dimethylaniline is prepared by heating a mixture of aniline, methyl alcohol and methyl iodide. The dimethylaniline is separated and evaporated to dryness, and the aqueous residue may be used again as a catalyst. Alternatively, other iodides may be used.

145,696. AMMONIUM SULPHATE. F. J. Collin, Akt.-Ges. zur Verwertung von Brennstoffen und Metallen, 14, Beurhausstrasse, Dortmund, Germany. International Convention date, May 17, 1919.



The object is to obtain ammonium sulphate from gases containing cyanogen or hydrocyanic acid, after the separation of ammonia with steam and sulph[illegible] acid. The hot gases p[illegible] the apparatus through[illegible] inlet 14, and then through the heating jacket 8 and pipe 15 to the saturator. The gas passesfrom the saturator by the pipe 17, 18 to the bell-shaped absorbing chambers 2, 3, 4, 5, 6 and thence to the outlet 12. Sulphuric acid is supplied by the pipe 7, and passes to the saturator through a pipe, 19. Sulphuretted hydrogen may be added, if not already present, to facilitate the conversion of the cyanogen into ammonia. In a modification, the upper part of the apparatus shown may be placed within the saturator.

145,709; 145,710-1. FERRO-CHROMIUM. F. Krupp Akt.-Ges., Essen, Germany. International Convention dates, July 27, 1916, October 3, 1916 and January 11, 1918.

145,709. Molten high-carbon ferro-chromium is transferred from a blast furnace to a converter and blown to reduce the carbon and produce low-carbon ferro-chromium.

145,710. This is a patent of addition to 145,709 above. To produce ferro-chromium low in carbon and silicon, the high-carbon product is blown as above in an acid-lined converter, and lime is added at about the stage when brown fumes are evolved.

145,711. This is a patent of addition to 145,709 above. The process in 145,710 is modified by blowing until the stage when oxidation of chromium would occur, and then injecting steam into the blast.

145,781. AMMONIUM SULPHATE. F. J. Collin, Akt.-Ges. zur Verwertung von Brennstoffen und Metallen, Dortmund, Germany. International Convention date, April 2, 1919.

The siphon for discharging ammonium sulphate from the saturators is liable to become encrusted around the outlet. To prevent this, the air for operating the siphon is heated so as to raise the temperature in the saturator liquor around the siphon.

145,789. TIN AND ANTIMONY, REFINING. G. Bonnard, Plombière-St. Marcel, Savoie, France. International Convention date, April 5, 1919.

Crude tin is treated with dry chlorine, the liquid filtered, treated with water to decompose chlorides of antimony, arsenic and sulphur; filtered again, and then electrolysed to recover the tin. If the antimony is required, the reaction is effected at 115°C.–120°C., so that antimony trichloride is produced, and it is filtered out at the first filtration.

145,802. ACRIDINE DYES. Akt.-Ges. für Anilin-Fabrikation, Treptow, Berlin. International Convention date, April 22, 1915.

A mono or di-formyl derivative of a *m*-diamine of the benzene series is heated with (1) a salt of a monoalkylated or unsymmetrically dialkylated *m*-diamine of the benzene series; or (2) β-naphthylamine hydrochloride. Alternatively, formyl derivatives of mono-alkylated or unsymmetrically dialkylated *m*-diamines of the benzene series, or formyl-β-naphthylamine may be heated with salts of *m*-diamines of the benzene series or their monoalkylated or unsymmetrically dialkylated derivatives. Numerous examples are given. The products dye leather yellow to orange-red shades.

LATEST NOTIFICATIONS.

150,303. Printing with dyestuffs. Farbwerke vorm Meister, Lucius, and Bruning. August 23, 1919.

149,988. Cement from Slag. Boveroulle, R. August 7, 1919.

149,970. Press rollers for pressing out water from wood-pulp cellulose and the like. Aktiebolaget Karlstads Mekaniska Verkstad. August 16, 1919.

149,974. Converting c[illegible]bustible substances into soluble organic compounds. F. [illegible]cher. June 10, 1919.

149,979. Production of [illegible]sinous bodies from phenols and oxygen. F. Fischer. May 24, 1919.

150,280. Preparation of [illegible]ompounds of alumina for sizing paper, and for other industrial purposes. G. Muth and L. Duvinage. August 18, 1919.

Specifications Accepted, with Date of Application

127,814. Unsaturated fatty acids, Process for polymerisation of-at low temperature. Nordiske Fabriker De-No-Fa Aktie, selskap. June 4, 1918.

149,707. Calcium and magnesium from rock salt, brine or solutions of rock salt in water. F. A. Freeth and L. A. Munro. February 15, 1919.

149,728. Soap. M. Longbottom. May 23, 1919.

149,733. Retorts and the like. Merz & McLellan, A. C. Michie and E. G. Weeks. May 14, 1919.

149,748. Glycerine and fatty acids, Process for splitting fats and oils in the manufacture of. W. J. Mellersh-Jackson. (*Twitchell Process Co.*) May 15, 1919.

149,752. Analysis and recording of gases, Apparatus for automatic and continuous. W. D. R. Brown and W. T. Pickston. May 16, 1919.

149,759. Gas producers. G. H. Bentley and E. G. Appleby. May 16, 1919.

149,764. Rotary kilns for burning cement and the like. J. S. Fasting. June 14, 1918.

149,769. Alumina, Process for the manufacture of. J. Morel. May 17, 1919.

149,773. Carbonising wood and other carbonaceous materials, Process and apparatus for. J. F. Wells. May 19, 1919.

149,776. Distilling and fractionating liquids, Apparatus for. J. Y. Johnson. (*H. L. Allan.*) May 20, 1919.

149,783. Aluminium nitrate, Preparation of. J. J. Hood. May 20, 1919.

149,790. Gas producers. H. M. N. Milton. May 26, 1919.

149,808. Filters. R. B. Carpmaels. (*L. C. Davies.*) June 4, 1919.

149,869. Peat, Process and appaartus for the treatment of, and for the production of turf or peat briquettes. E. P. T. R. Ulmann. November 6, 1919.

149,893. Muffle furnaces, Electric. J. R. C. August. October 18, 1919.

Applications for Patents

Bengué, J. Means for closing glass bottles for chloride of ethyl, &c. 25,367. September 2. (France, September 3, 1919.)

Carmichael & Co., J. F. and Guillaume, F. Apparatus for extracting, distilling, &c., oils, greases, sewage, &c. 25,072. August 31.

Cassella & Co., L. Manufacture of a colour of the anthraquinone series. 25,263. September 1. (Germany, September 1, 1919.)

Dayton Metal Products Co. Hydrogenation apparatus. 25,144. August 31. (United States, October 5, 1918.)

Farbwerke vorm. Meister, Lucius, & Brüning. Process of desulphurising gases. 25,154. August 31. (Germany, July 2.)

Hansford, J. B. Manufacture of neutral sulphate of ammonia. 25,505. September 4.

Johns, G. M. Distillation of material carrying volatile matter. 25,391. September 2.

,, Vapour-condensing apparatus. 25,392. September 2.

Jones, B. D. Explosives. 24,984. August 30.

Kelly, A. A. Explosives. 24,984. August 30.

Lundsgaard, C. J. S. Explosives. 25,486. September 3.

Mathieson Alkali Works. Recovery of ammonia. 25,402. September 3.

Mitchell, J. L. Manufacture of lithopone. 25,282. September 1.

Nitrogen Corporation. Method of producing sodium bicarbonate and hydrogen. 25,359. September 2. (United States, February 7.)

Pattison, E. W. (Mathieson Alkali Works). Recovery of ammonia. 25,402. September 3.

Robertson, A. D. Recovery of high-boiling acid. 25,206. September 1.

Robertson & Sons, A. Recovery of high-boiling acid. 25,206. September 1.

Röhm & Haas. Manufacture of alkylenecyanhydrines. 25,261. September 1. (Germany, September 3, 1919.)

Terrell, T. Preparation of thoria and thorium salts. 25,435. September 3.

Trescott, J. B. Retorts. 25,484. September 3.

Wichmann, G. H. Manufacture of metal alloys. 25,218. September 1

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in values should study the market report.*

British Market Report

THURSDAY, September 9.

Trading conditions remain particularly quiet, and there is little change to report since last week. The prospect of a miners' strike and other serious labour troubles is undoubtedly contributing to the general depression. There has been a fair export enquiry and a moderate volume of business has been passing.

New Home Trade Alkali Prices

SODA CRYSTALS, £7 per ton, carriage paid U.K., bags free.

AMMONIUM ALKALI 58 per cent. £8 8s. per ton F.O.R. makers' works, bags free.

BICARBONATE OF SODA, £2 per ton increase, bags free, F.O.R. makers' works.

CALCIUM CHLORIDE, 17s. 6d. per ton increase, F.O.R. makers' works, bags free.

CAUSTIC SODA all strengths unchanged.

These prices are fixed until the end of the year.

General Chemicals

ACETONE is unchanged in price and in normal demand.

ACETIC ACID has attracted considerably more interest during the last few days. Quite a good business has been done for spot and early delivery. The spot price, whilst nominally unchanged, is inclined to harden.

ACID CARBOLIC remains uninteresting and little business is reported.

ACID CITRIC is only in small demand, but the firmer tendency which we predicted last week seems to continue.

ACID FORMIC is in steady enquiry. The price is firmer.

ACID LACTIC is a very small business. Price unchanged.

ACID OXALIC is rather lower in price in consequence of foreign offerings, but the quantities available are very limited, and any improvement in demand will quickly affect the market.

ACID TARTARIC.—Second-hand holders have become tired of selling at a loss, and as their commitments have been substantially reduced, there is a tendency to hold out for a rather better price.

AMMONIUM ALKALI, 58 per cent.—As reported last week the English makers have advanced the price to compensate themselves for the increase in transit charges, and the result of decreased production.

BARIUM SALTS are quiet and unchanged in value.

BLEACHING POWDER.—The makers' prices are unchanged, but there is a substantial demand at the moment, and higher prices are reported in second-hands.

COPPER SULPHATE is still a sick market, and whilst the price is nominally unchanged, concessions can be obtained for such business as is going.

CALCIUM CHLORIDE.—Prices have also advanced as in the case of the Soda products.

FORMALDEHYDE is in rather slow demand, but the price is steady.

LEAD SALTS.—Business is almost dead although the prices are nominally unchanged.

POTASSIUM BICHROMATE is in small demand without change in value.

POTASSIUM PERMANGANATE.—Only a small volume of business is passing, and the price is inclined to be slightly easier.

SODIUM ACETATE is in rather better demand, and the price is firmer.

SODA CAUSTIC.—The English makers' price has not been advanced as in the case of other soda products. The second-hand market is inclined to be a little easier.

SODA BICARBONATE.—The same conditions apply as in Soda Crystals.

SODIUM BICHROMATE.—There is no change in the second-hand market since last week, and the quantities available are small.

SODA CRYSTALS.—The English makers have advanced their prices for the same reason as in the case of Ammonium Alkali.

Coal Tar Intermediates

There is little of interest to report in this section. Values remain quietly steady, and while there is little fresh business to report, manufacturers are well occupied with business in hand, and are not at all inclined to make concessions.

ALPHA NAPHTHOL is without change in price, and early delivery cannot be obtained.

BETA NAPHTHOL is in little request. The price, however, is unchanged.

DI METHYL ANILINE has been asked for, but little prompt material can be found.

NITRO BENZOL is very firm, with an upward tendency.

PARANITRANILINE is without change, and price is quietly steady.

Coal Tar Products

There is very little change to report in prices, although there appears to be less new business doing.

90's BENZOL is quoted at 3s. 4d. to 3s. 5d. on rails in the North, and 3s. 6d. to 3s. 7d. on rails in the South.

PURE BENZOL is worth about 3s. 9d. per gallon.

CREOSOTE OIL remains firm and in good demand at a price of about 1s. 1d. to 1s. 1½d. in the North, and 1s. 2d. to 1s. 2½d. in the South.

CRESYLIC ACID remains unchanged, and somewhat slow. Prices are still 4s. to 4s. 2d. per gallon for the dark, 95/97 per cent., quality, and 4s. 7d. to 4s. 10d. for the pale, 97/99 per cent. quality.

SOLVENT NAPHTHA, 90/160, is weak, and worth about 3s. 1d. per gallon on rails.

HEAVY NAPHTHA, 90/190, is still worth 3s. 6d. per gallon.

NAPHTHALENE is in good demand, the crude qualities being very scarce, and worth anything from £16 to £25 per ton. The refined is worth from £50 to £55 per ton.

PITCH.—Business is more active and prices still show an upward tendency. London is quoted at 220s. to 225s., and East Coast at 210s. to 215s.

Sulphate of Ammonia

The position remains unchanged, but more interest is taken in export business.

French Market Report

Trade has been very dull in this market, with few transactions of any size, buyers preferring to cover their requirements on the hand-to-mouth basis.

On the other hand, there have been few price changes, but concessions here and there can be noted on the part of second-hands, in their endeavours to relieve themselves of their stocks.

ACID OXALIC is a turn higher at about 1,500 frs. per 100 kilos. A fair business has been transacted.

MAGNESIUM CHLORIDE has also advanced.

COPPER SULPHATE is in some little enquiry for forward position, and the quotation has advanced to 220 frs.

FORMALDEHYDE is weak, and little business is passing.

LEAD PRODUCTS are about as they were, and acetate is standing at about 550 frs. Good business has been transacted in nitrate.

POTASSIUM PERMANGANATE has been in request.

POTASSIUM YELLOW PRUSSIATE is standing at 1,350 frs.

POTASSIUM META BISULPHITE is only a moderate market at 1,250 frs.

SODIUM ARSENIATE is a shade higher with very fair enquiry.

SODIUM SULPHIDE is offered at about 320 frs. with Crystals at 250 frs.

German Market Report

There has been a fair amount of activity in the German market, although the tendency is uncertain. The larger works seem to be producing more material, and an increased number of offers from manufacturers are being made, and it is very evident that the German producers are using every possible endeavour to get back as much trade as possible.

Price changes have been relatively few, but in many cases supplies can be obtained at under current quotations.

ACID ACETIC is without change in price.

ACID OXALIC is in good request, but reliable quotations are difficult to obtain. Perhaps about 30 marks per kilo may be taken as a fair value.

AMMONIA SALTS continue quiet, but there seems to be a somewhat better demand for SALAMMONIAC.

COPPER SULPHATE is in better request, and a shade higher, at 525 marks per kilo.

CHROME ALUM is in request at about 10 marks per kilo.

LEAD PRODUCTS are firm, and there has been a sharp rise in LITHARGE, which is now quoted at about 10 marks.

LITHOPONE is idle, but works seem to be well occupied with orders on hand.

POTASH BICHROMATE is without change in price, but is reported as a quiet market.

POTASH PERMANGANATE is in better demand, and business has been done round about 50 marks per kilo.

SODIUM BICARBONATE is quiet and easy.

SODIUM CAUSTIC is only moving off slowly and the price is inclined to sag.

SODIUM SULPHIDE is in better request, and the value may be taken at about 825 marks.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	3	9	to	0	4	0
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	120	0	0	to	125	0	0
Acid, Acetic, glacial, 99-100%	ton	105	0	0	to	110	0	0
Acetic, 80% pure	ton	87	10	0	to	90	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	1	0½	to	0	1	1
Citric	lb.	0	4	6	to	0	4	9
Fluoric	lb.	0	0	7½	to	0	0	8
Formic, 80%	ton	115	0	0	to	120	0	0
Gallic, pure	lb.		7	6	to	0	7	9
Hydrofluoric	lb.	0	0	7½	to	0	0	8
Lactic, 50 vol.	ton	58	0	0	to	60	0	0
Lactic, 60 vol.	ton	72	10	0	to	75	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	2	4	to	0	2	5
Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	3	to	0	2	6
Salicylic, B.P.	lb.	0	3	1	to	0	3	2
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	3	1	to	0	3	2
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	92	0	0	to	93	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	100	0	0	to	105	0	0
Ammonia, muriate (galvanisers)	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	65	0	0	to	70	0	0
Ammonia, phosphate	ton	120	0	0	to	125	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	74	0	0	to	76	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	32	0	0	to	33	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	28	10	0	to	30	0	0
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	8
Bleaching powder, 35-37%	ton	28	0	0	to	29	0	0
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	20	0	0	to	21	0	0
„ Grey	ton	34	0	0	to	35	10	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	9	10	0	to	10	10	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	8	6	to	0	9	0
Oxide, black	lb.	0	10	0	to	0	10	3
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	41	0	0	to	42	0	0
Cream Tartar, 98-100%	ton	275	0	0	to	280	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	325	0	0	to	330	0	0
Formusol (Rongalite)	lb.	0	5	0	to	0	5	6
Glauber salts	ton		Nominal.					
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	9	to	0	2	10
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	85	0	0	to	87	10	0
Carbonate (White Lead)	ton	65	0	0	to	67	10	0
Nitrate	ton	55	0	0	to	57	0	0
Litharge	ton	57	0	0	to	59	0	0
Lithopone, 30%	ton	50	0	0	to	51	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	13	10	0	to	14	0	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	190	0	0	to		—	
Sulphate	ton	100	0	0	to	105	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.		Nominal.					
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potassium bichromate	lb.	0	1	10½	to	0	1	11
Carbonate, 90%	ton	115	0	0	to	120	0	0
Chloride	ton	50	0	0	to	52	0	0
Chlorate	lb.	0	0	9½	to	0	0	10½
Meta-bisulphite, 50-52%	ton	260	0	0	to	270	0	0
Nitrate, refined	ton	65	0	0	to	67	0	0
Permanganate	lb.	0	4	0	to	0	4	3
Prussiate, red	lb.	0	4	3	to	0	4	6
Prussiate, yellow	lb.	0	2	0	to	0	2	1
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	10	0	to		—	
Seconds	cwt.	5	5	0	to		—	
Sodium acetate	ton	59	0	0	to	61	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	1	6	to	0	1	6½
Bisulphite, 60-62%	ton	50	0	0	to	52	10	0
Chlorate	lb.	0	0	5	to	0	0	5½
Caustic, 70%	ton	36	0	0	to	37	0	0
Caustic, 76%	ton	38	10	0	to	39	0	0
Hydrosulphite, powder, 85%	lb.	0	4	0	to	0	4	6
Hyposulphite, commercial	ton	35	10	0	to	37	10	0
Nitrite, 96-98%	ton	87	10	0	to	90	0	0
Phosphate, crystal	ton	47	0	0	to	49	0	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	2½	to	0	1	3½
Sulphide, crystals	ton	30	0	0	to	32	0	0
Sulphide, solid, 60-62%	ton	55	0	0	to	57	0	0
Sulphite, cryst.	ton	15	10	0	to	16	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	90	0	0	to	95	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	3	2	to	0	3	4
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	82	10	0	to	85	0	0
Oxide, 94-95%	ton	70	0	0	to	72	10	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	5	6	to	0	5	9
Alphanaphthylamine	lb.	0	3	9	to	0	4	0
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	9	to	0	6	0
Benzidine, base	lb.	0	13	6	to	0	14	0
Benzidine, sulphate	lb.	0	10	6	to	0	11	0
Benzoic acid	lb.	0	5	3	to	0	5	6
Benzoate of soda	lb.	0	5	3	to	0	5	6
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	5	6	to	0	5	9
Betanaphthylamine, technical	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	4	to	0	1	5
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	5	9	to	0	6	0
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	14	6	to	0	15	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	6	to	0	6	0
Naphthionate of Soda	lb.	0	6	0	to	0	6	3
Naphthylamin-di-sulphonic-acid	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	4	to	0	1	6
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	6	to	0	2	9
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	15	0	to	0	16	0
Para-amidophenol, hydrochlor	lb	0	15	6	to	0	16	6
Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	0	8	6	to	0	9	0
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	6	to	0	9	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	1	2	6	to	1	5	0
Salol	lb.	0	6	9	to	0	7	6
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	6	to	0	1	7
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

Alsatian Potash

Numerous enquiries are being made just now for supplies of Alsatian potash for the Colonies as well as for the United Kingdom, but owing to the impending coal strike large orders are being postponed until delivery can be assured. To avoid the possibility of a shortage, and a rise in prices in the spring, farmers are advised to book their orders early. The following are the approximate quotations F.O.R. in bags for the past week: Sylvinite 14-16 per cent. (French kainite), £7 13s. 6d.; sylvinite, 20-22 per cent. (French potash manure salts), £9 13s. 6d.; sylvinite, 30-32 per cent. (French potash manure salts), £13 13s. 6d.; muriate of potash, 50 per cent., £28 5s.

Recent Wills

Mr. T. Brown, of Hunstanton, managing director of the West Norfolk Farmers' Manure & Chemical Co., Ltd. £22,904

Mr. C. W. Turner, of Castille, Worthing, late proprietor of Anderson & Vigo, chemists, Worcester (net personalty, £21,882) £25,862

Mr. G. J. Windeatt, of Exeter, chemist £7,931

Mr. James Hamilton, of The Hollies, Newlands, Glasgow, merchant, of William Milne & Co., of Glasgow, manager of the Burma Oil Co., Ltd. £212,829

Company News

PEARSON & KNOWLES COAL AND IRON.—The directors recommend a dividend of 5 per cent., placing £96,000 to the reserve fund.

DOMINION GLASS.—A quarterly dividend has been declared of 1 per cent. ($ per share), less tax, on common stock, payable on October 1. Last year the dividend was the same.

BRADFORD DYERS' ASSOCIATION.—An interim dividend has been declared on the ordinary shares at the rate of 1s. per share, less tax, equal to a net payment of 8·4d. per share.

SCOTTISH IRON AND STEEL.—The directors have declared interim dividends of 4 per cent. actual on preference and 5 per cent. actual on ordinary shares for the half-year to June 30 last.

HARRISONS & CROSFIELD.—The directors have declared a dividend on the cumulative preference shares at the rate of 6 per cent. per annum, less tax, for the three months to September 30.

MINING CORPORATION OF CANADA.—A dividend has been declared of 12½ cents per share, less tax, for the quarter to September 30, payable on October 2 to holders on the London register on September 6.

LIMMER AND TRINIDAD LAKE ASHPHALT.—An interim dividend has been declared of 15 per cent. per annum (1s. 6d. per share), less tax, on the ordinary shares for the half-year, paid on August 26. Last year no interim dividend was paid.

LAWES' CHEMICAL MANURE.—The accounts for the year to June 30 last show an available total (including balance brought in) of £31,642. After paying the usual preference dividend of 7 per cent., less tax, the directors recommend an additional ½ per cent. dividend, less tax, to make the rate equal to that on the ordinary shares, and a dividend of 15s. per share on the ordinary shares, less tax; to reserve for bad and doubtful debts, £500; carry forward, £6,491. A sum of £7,500 for depreciation has been written off in the accounts for the year.

ROUMANIAN OIL FIELDS.—Considerable activity prevails in connection with the Roumanian oil industry, the available oil lands, according to report, being taken up by the Standard Oil, the Royal Dutch, and other groups. The Roumanian Government, it is stated, has now come to an agreement with the Allied Governments on the question of compensation to the companies whose wells, machinery, and stocks of oil were destroyed to prevent their falling into the hands of the Germans. The Roumanian Consolidated Oilfields, Ltd., the largest British oil concern in Roumania, is understood to have even now a production at the rate of over 30,000 tons per annum, and its new boring programme is so far advanced that its production will be largely increased before the end of 1920. This company recently got judgment in the courts against the English Government for a claim of over £1,250,000 on account of the destruction of its property at the time of the German invasion. Although an appeal has been entered, it is expected that the claim will be adjusted, seeing that the Governments have come to an agreement on the general question of compensation to the interests concerned.

CALICO PRINTERS' ASSOCIATION.—The present report and accounts cover a period of two years ended June, 1920. The profits, after providing for excess profits duty, corporation tax, and £1,567,432 for maintenance, depreciation, repairs, renewals, and upkeep, and £256,000 for debenture interest, amount to £1,216,961. From this there are to be deducted dividends approved and declared at the last ordinary general meeting, namely, at the rate of 5 per cent. per annum on the preference shares for the year ended June 30, 1919, £150,805, and at the rate of 5 per cent. per annum on the ordinary shares for the year ended June 30, £100,537, leaving £966,619, and £73,041 was brought in, making £1,038,660. A dividend at the rate of 5 per cent. per annum is recommended on the preference shares for the year to June 30, 1920, against which the directors have declared and distributed an interim dividend on March 31, 1920, for the half-year ended December 31, 1919, £150,805; a dividend on the ordinary shares for the year to June 30, 1920, at the rate of 10 per cent. per annum, £201,074; to set aside for the benefit of employees £50,000; to reserve, £300,000; carried forward, £336,781. Meeting, Memorial Hall, Albert Square, Manchester, September 15, at 11:

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

CHATWIN, EDWARD ERNEST, & WOODWARD, MARK, manufacturing chemists, 96, Spring Hill, Birmingham under the style of Food Products Co., by mutual consent as from August 30.

Notice of Dividend

HUTCHISON, JOSEPH ANDERSON, 44, Deane Avenue, Bolton, tar distiller. 11½d. first and final. September 10. Official Receiver's offices, Byrom Street, Manchester.

Companies Winding Up Voluntarily

SAN LORENZO NITRATE CO., LTD. (winding up voluntarily for the purposes of amalgamation).—Liquidator, H. H. Robson, 12, King Street, Liverpool.

BUENA VENTURA NITRATE CO., LTD. (winding up voluntarily for purposes of amalgamation).—Liquidator, R. A. Watson, 95, Gresham Street, E.C. 2.

BLACKAMORE CHEMICALS & COLOURS, LTD.—A meeting of creditors will be held at 6, Quality Court, Chancery Lane, London, W.C. 2, on Wednesday, September 8, at 11.30 a.m. E. C. Finlason, Liquidator.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of* 1908, *provides that every Mortgage or Charge, as described therein, created after July* 1, 1908, *shall be registered within* 21 *days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July* 1, 1908, *require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

BAKERS (LEEDS), LTD. (formerly BAKER OIL SEPARATOR CO., LTD.), Hunslet.—Registered August 30, £1,600 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £800; general charge. *£800. February 17, 1920.

LAMBETH GLASS WORKS, LTD., LONDON, E.C.—Registered August 24, £5,000 1st mortgage debenture, to C. H. Jarrett, 3, Broad Street Place, E.C. and another; general charge. *Nil. June 9, 1920.

RADIUM ORE MINES, LTD., LONDON, E.C.—Registered August 28, £350 debentures, part of £10,000; general charge. *£2,818. December 31, 1918.

RICHMOND GLASS WORKS, LTD.—Registered August 31 (by order on terms), £1,000 mortgage, to North British and Mercantile Insurance Co., 61, Threadneedle Street, E.C.; charged on freehold land, messuage, gardens, &c., known as The Retreat, Friars Lane, Richmond.

SHAKA SALT CO., LTD., MIDDLEWICH.—Registered August 26, £200 debentures, part of £2,000; general charge.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

EUDERMINE CO., LTD.—Receiving Office, 79, Coleman Street, London, E.C. Druggists' sundries. £35 9s. 6d. July 22.

NOBLES DRUG STORES, LTD., 2, Well Street, Cable Street, London, E.C. Druggists. £11 11s. 1d. July 29.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.:—

ELECTRO-CHEMICAL INDUSTRIES, LTD., Regent House, Regent Street, W. Smelters and reducers of ores and minerals. Nominal capital £10,000 in 9,000 20 per cent. cumulative preference shares of £1 each and 20,000 ordinary shares of 1s. each. Directors to be appointed by subscribers.

MAY, A. & J., LTD., 121, Kingsway, W.C. Chemical engineers, &c. Nominal capital, £2,000 in 1,000 preference shares of £1 each and 2,000 ordinary shares of 10s. each. Directors to be appointed by subscribers. Qualification of directors, one share. Remuneration of directors, £150 each, chairman, £200.

UNITED BITUMEN AND ASPHALT SUPPLY CO., LTD., 36, Camomile Street, Bishopsgate, E.C., Bitumen and asphalt merchants. Nominal capital, £12,000 in 12,000 shares of £1 each. Directors: W. Mumford (chairman) and A. Horne. Qualification of directors, £1,000.

August Trade Returns

THE unsettled conditions which prevail in trade and industry are reflected in the trade returns for the month of August, for, although export values show an increase of over £40,000,000 compared with the corresponding month last year, they fall short of the total reached in July by £22,548,569. Notwithstanding the fact that imports show a decline of £10,087,773 as compared with those of July, if to the total of £114,903,335, representing British exports, is added the sum of £13,368,347, representing re-exports, we still have an adverse trade balance for the month of £24,982,896.

This sharp decline in our export trade breaks the continuity of the steady rises which have characterised the monthly returns since the beginning of the present year, as is shown by the following table:—

January	£105,879,909	May	£119,319,422
February	85,964,130	June	116,352,350
March	103,699,381	July	137,451,904
April	106,251,692	August	114,903,335

Each class of export shows a decided advance over the returns for August, 1919, but it is to those articles wholly or mainly manufactured here that one has to look for an explanation of the sharp drop over the previous month's figures, for whereas the figures for the month of July under this head represented £118,953,602, in August the figure fell to £99,645,443, a decrease of £19,308,159.

The imports for the month were £153,254,578, an increase of £4,505,319 over August, 1919; exports £114,903,335, an increase of £40,129,738; re-exports £13,368,347, a decrease of £1,942,578.

The value of the chemicals, drugs, dyes and colours imported last month was £257,012, an increase over August, 1919, of £1,673,222; of oil seeds, nuts, oils, &c., £6,187,639, a decrease of £3,652,850; hides and skins, undressed, £1,489,005, a decrease of £783,761; oils, fats and resins, manufactured, £6,542,640, an increase of £3,559,374; leather and manufactures thereof, £970,050, a decrease of £3,874,223.

As regards exports, we exported chemicals, drugs, dyes and colours to the value of £3,214,714, an increase of £865,171; oil seeds, nuts, oils, &c., £23,980, a decrease of £3,309; hides and skins, undressed, £175,396 an increase of £62,573; oils, fats leather and resins, manufactured, £988,435, a decrease of £300,927; and manufactures thereof, £822,757, an increase of £137,112.

Taking the quantities as distinct from values, we exported 6,608 tons of oils, fats, &c., as against 14,408 tons in August, 1920; china clay, 89,181 tons, against 28,048 tons; coal tar, pitch, 6,879 tons, against 7,848 tons; coke and fuel, 362,558 tons, against 296,052 tons; soda compounds, 799,919 cwt., against 567,878 cwt.; dyestuffs, 22,262 cwt., against 21,011 cwt.; painters' colours, 135,952 cwt., against 109,516 cwt.; soap, 127,542 cwt., against 234,770 cwt.; candles, 10,079 cwt., against 24,595 cwt.; linoleum, 3,707,300 sq. yds., against 2,093,400 sq. yds.; cement, 55,888 tons, against 40,483 tons.